

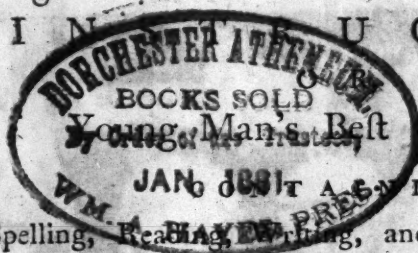


*Tis to the Press & Pen we must owe | All hail ye great preservers of those Arts
 All we believe & almost all we know | That raise our thoughts & cultivate our*



*Tis to the Press & Pen we most owe | All hail ye great preservers of those Arts
 All we believe & almost all we know | That raise our thoughts & cultivate our*

Samuel THE *May Junr*
INSTRUCTOR; 1790



Young Man's Best Companion.

JAN 1881

Spelling, Reading, Writing, and Arithmetic, in an easier way than any yet published.

Instructions to write variety of hands, with copies. How to write letters on business or friendship; forms of indentures, bonds, bills of sale, receipts, wills, leases, releases, &c.

Merchants Accounts, and a short and easy method of shop and book keeping; with a description of the product, counties, and market towns in England and Wales, and a list of English and Scots Fairs according to the new style.

The METHOD of measuring Carpenters, Joiners, Sawyers, Bricklayers, Plasterers, Plumbers, Masons, Glaziers, and Painters work. How to undertake each work, and at what price; the rates of each commodity, and the common wages of journeymen, with the description of Gunter's Line, and Coggeshall's Sliding rule.

The PRACTICAL GAUGER made easy; the art of Dialling, and how to erect and fix dials; with instructions for dying, colouring, and making colours; and some general observations for gardening every month in the year.

To which are added,

The FAMILY'S BEST COMPANION;

AND

A COMPENDIUM OF GEOGRAPHY and ASTRONOMY.

ALSO

Some useful INTEREST-TABLES.

By GEORGE FISHER, ACCOUNTANT.

THE TWENTY-THIRD EDITION.

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John J. May,
of Dorchester.

P R E F A C E.

I Need say but little by way of preface, in relation to the usefulness of this book, the title-page so fully declaring its contents: but as a preface is usually expected, I cannot well avoid saying something with respect to its utility.

As to the first step of forming the young man's mind for business, *viz.* the being instructed in, and acquainted with our mother-tongue, *viz.* English, it must be and is acknowledged by all, to be a necessary and principal qualification in business, and therefore it is of great importance to be well acquainted therewith.

In the next place, to write a good, fair, free, and commendable hand, is equally necessary in most, if not in all the affairs of life, and occurrences of business.

The young man is, next, informed how to indite epistles or letters in a familiar stile, and on sundry subjects and occasions: with directions how to subscribe or conclude a letter, and also to superscribe or direct letters, according to the different ranks and qualities of the persons to whom directed: and this must be allowed to be a very great additional qualification.

The next accomplishment for a young man, and largely treated on in this book, is that excellent science of *Arithmetic*, both vulgar and decimal; leading him by the hand, and by easy-steps, through its whole course.

Again, the young man is next shewn the ingenious art of Book-keeping after the Italian manner, by way of double entry; and that is an accomplishment that capacitates him for business in the highest degree: under which head, he is also informed how to draw out, or make various accounts or writings relating to mercantile affairs; as bills of lading, invoices, accounts of sales, together with authentic examples of bills of exchange, with notes concerning them; likewise bills

of parcels of divers kinds; also various sorts of receipts, &c. All which is expedient for a young man to know and understand, if he would be dexterous in business.

The young man is here also instructed in relation to the affairs of business at the water-side, as to shipping off and landing goods, &c.

He hath also a description of England and Wales, each county being particularly spoken of, with respect to its product, soil, and extent; likewise the names of its several market-towns, and a list of the fairs now held in them, as they have been settled since the alteration of the style.

Here are also easy, plain, and likewise curious directions for measuring all sorts of planes and solids, (arithmetically and instrumentally), as the works of carpenters, joiners, sawyers, bricklayers, masons, plasterers, painters, glaziers, &c. with the prices of their works.

Here are likewise shewn the methods of extracting the square and cube-roots, with some of their uses, in relation to measuring, &c.

Also practical gauging of divers kinds of vessels, runs, &c. Likewise dialling in various kinds, with the representation of several sorts of dials, and how to beautify and adorn them.

Next are precedents of law-writings, as bonds, bills, indentures, wills, letters of attorney, &c.

Lastly, some directions relating to the pleasant and delightful art of gardening, with general observations for every month in the year. To which are sub-joined some instructions to young women, how to pickle and preserve all kinds of fruits and flowers, &c. with instructions for making divers sorts of wines of English growth; and also for preparing many excellent medicines, plasters, &c. with several good prescriptions of proper use, against most distempers: fit for, and necessary in all families.

To the whole is now added a compendious system of geography and astronomy: the first is of great utility to the trading part of mankind, and to those who would have an adequate idea of what they read in history,

P R E F A C E.

history, or otherwise, of the transactions in different parts of the earth; and the second is of like service to those who would contemplate on heavenly bodies, and is purposely designed to give the unexperienced reader some small idea of the almost inconceivable number of bodies, (most of them much superior in magnitude to our world, as we vainly term it), which the Almighty and infinite Creator hath placed in the universe, and exhibited to the view and conception of mankind.

Also concise tables to find the value of Portugal pieces, to buy or sell by the great hundred; and to shew the interest of any sum at 3, 4, and 5 per cent.

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Young Man's Best Companion.

INSTRUCTIONS for YOUTH, to SPELL, READ, and WRITE true ENGLISH.

The use of letters ; which are vowels and which consonants ; what diphthongs are, their number, and how pronounced and written.

THE design of this book being to instruct mankind, especially those who are young, in the methods of conversing, and transacting business, in the world ; therefore that most necessary accomplishment of spelling, and writing good and proper English, claims the first notice ; for let a person write ever so good a hand, yet if he be defective in spelling, he will be ridiculed and contemptibly smiled at, because his writing fair will render his orthographical faults the more conspicuous. Therefore,

First, Take notice, that of letters are made syllables, of syllables words, and of words sentences, &c.

The letters are in number 26 ; viz. *a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, and z* ; of these *j* and *v* were formerly wrote *i* and *u* ; and have for that reason been frequently called *i* consonant, and *u* consonant ; but they have been, of late, more properly called *ja* and *ve*. In these letters we are to observe their names, their form, and their force : their names whereby to know them ; their form, whether great or small ; and their force, in pronunciation or utterance.

Letters are distinguished according to their sound, into vowels and consonants. A *vowel* is a letter that soundeth by itself, and they be six in number, viz. *a, e, i, o, u, and y* the Greek vowel ; which also is an English vowel, when it cometh after a consonant, and hath the sound of *i* ; as in *by, fly, reply, syllable, &c.* but is never used, in words not derived from a foreign language, otherwise than at their end. A *consonant* is a letter that soundeth not, except it be joined with a

vowel, for without one of the vowels no syllable can be made; as *b, c, d, &c.* without the aid of a vowel, cannot be sounded. Though we have twenty-six letters, and six of them vowels, yet we have twenty-one consonants: for *y*, when set before any vowel in the same syllable, becomes a consonant; as in *youth, yonder, beyond, &c.* Note, that *j* hath the sound of *g*, as in *join, jangle, jingle, &c.*

When two vowels come or meet together in a syllable, and are not parted in the pronunciation, but united in one sound, such are called *diphthongs*; of these there are thirteen, viz. *ai, ei, oi, ui, au, eu, ee, oo, ea, eo, oa, and ie*; as in *maid, faith, either, join, aul, eunuch, stout, seed, feed, food, brood, stealth, wealth, people, steeple, boat, goat, heat, beat, feat, friend, field, &c.* Note, That in the first seven words both vowels are sounded; but in the other fifteen, one of them is scarcely heard.

There are also those that are called *triphthongs*, where three vowels meet in one sound; as in *beauty, beau, lieu, and quaint*: likewise *ay, ey, oy, uy*; *aw, ew, and ow*, became *diphthongs* at the end of words, but are called *improper diphthongs*; as in *say, key, joy, saw, bow, &c.* Note *aw, ew, and ow*, are commonly sounded as *au, eu, and ou*.

Of letters great and small, and when to be used.

First, negatively, *great letters* are not to be used in the middle or latter end of a word, except the whole word be so written, as in *JEHOVAH, LORD*, or in titles of books, &c. For it would be very absurd to write thus: *To Mr geoRgE RoGeRs in thAMes StReEt*; instead of, *To Mr George Rogers in Thames Street*.

Secondly, positively, *great letters, or capitals*, are to be written at the beginning of sentences; as, *Fear God. Honour the King. Knew when to speak, and when to hold your tongue.*

After every period, or full stop, when new matter begins: as, *Some time after that accident, another happened, which was as follows. On the 16th of May, &c.*

At the beginning of all proper names of places, ships, rivers, &c. as *London, the Dreadnought, Thames, Severn*: Also the Christian names and surnames, both of men and women, must begin with a great letter; as *Samuel Sharp, Mary Sweetings, &c.*

At the beginning of the more eminent words in a sentence ; as, *Faith is the foundation of the Christian religion* : or, of any word that we have a particular regard or deference for ; as, *God, Christ, King, Queen, &c.*

At the beginning of every line in poetry ; as,

*Improve your time. Time passeth quickly on ;
Nor doth so good succeed, as that that's gone.*

At the beginning of the names of arts, sciences, and trades ; as, *Writing, Arithmetic, Geometry, Music, Carpenter, Smith, &c.*

Note, The personal pronoun *I*, and the interjection *O*, must be always wrote in capitals ; for it is ridiculous to write thus, *On Monday last i came to your house, but you was not at home ; o how much it grieved me !*

Lastly, All nouns substantive may begin with a great letter ; and a substantive may be known by the signs either of *A*, *An*, or *The* before them ; as, *a Horse, a Mill, an Ox, an Afs, the City, the River, &c.* : but the adjective (which declares what sort of a thing the substantive is) should be wrote with a small letter ; as, *the white Horse, the long Rope, brown Bread, fat Beef, &c.* and small letters are commonly wrote in all other places.

Note, This custom of beginning all substantives with capital letters, is not followed, at present, by polite authors.

The small letter *s* is commonly written *f* at the beginning and in the middle of words, and *z* at the end ; but if two of them come together in the middle of a word, they may be written thus, *ss* or *sz*.

Observations concerning the sound of letters, and which are omitted in pronunciation.

A is not sounded in *Pharaoh*, nor in *Sabaoth* ; but as if written *Pharo* and *Saboth* ; neither in *marriage*, but as *marrige* ; also *parliament*, as *parliment*, and *chaplain*, as *chaplin*, &c. In some proper names it is not sounded, but dropped in the pronunciation ; as in *Aaron*, *Isaac*, *Canaan*, *Balaam* ; which are pronounced as if written, *Aron*, *Isac*, *Canan*, *Balam* ; but we must except *Ba-al* and *Ga-al*. *A* is sounded broad like *aw*, in words before *ld* and *ll* ; as in *bald*, *scald*, *ball*, *wall*, *fall*, &c.

B is not sounded in *thumb*, *dumb*, *plumb*, *lamb*, *doubt*,
B 2 *debt*,

debt, subtle, &c. but sounded as if written, *thum, dun, plum, lam, dout, det, suttile.*

C is sounded hard like *k*, before *a*, *o*, and *u*, and before *l* and *r*; as in these words, *cane, came, comb, cub, clay, crane, crab*; and soft in *cement, city, and tendency*. C loseth its sound in *scene, science, victuals, and verdict*; likewise in *indict, indictment*; also before *k*, as in *stack, rack, stick, thick, brick*. In words of Greek and Hebrew derivations, *c* is sounded like *k*, as in *sceptic, skeleton, Cis, Aceldama.*

Ch is sounded like *k*, in many foreign words, some of which occur in the holy Scripture; as in *chorus, chemist, Chrysostom, Christ, Chedorlassar, Baruch, Archippus, &c.* In the word *schism*, the sound of *ch* is lost, it being sounded as if wrote *sism*; and in the words *Rachel, cherubim*, and *Archbishop*, it is sounded in the English manner. *Ch* in French words sounds like *sh*, as in *chevalier*, pronounced *shevalier*; *machine, masheen; quareschal; marshal; capuchin, capushheen; chaise, shaise, &c.*

D is not sounded in *ribband*, nor in *Wednesday*, which are pronounced *ribben* and *Wensday*; the termination *ed* is often shortened into *t*; as *burned, burnt; choaked, choakt; ripped, ript; passed, past; chopped, chopt, &c.*

E is not sounded in *heart*, neither in *hearth, or dearth, &c.* *E final* that is placed at the end of a word, is seldom heard but in monosyllables; as in *me, he, she, ye, the, &c.* where it hath the sound of *ee*: and in words derived from foreign languages, in which *e* hath its perfect sound, as *Jesse, Jubilee, Mamre, Ninive, Candace, Gloc, Eunice, Penelope, Salmone, Phebe, epitome, catastrophe, Gethsemane, simile, premunir'e, &c.* In all other cases *e final* serves only to lengthen the sound, and to distinguish it from other words of different meaning, which are wrote without *e*, and are sounded short; as in these examples following, *viz. cane, can; hate, hut; bite, bit; fare, far; hope, hop; made, mad; mane, man; scrape, sorap; stare, star; tune, tun; write, writ, &c.* In words of more than one syllable, it lengthens the sound of the last syllable, but doth not increase the number of syllables; as, *admire, demise, blaspheme, &c.* *E* lengthens the syllable also in some foreign words, such as *Eve, Tyre, Crete, ode, scheme, dialogue, Kenite, and Shu la mite.* *E* is seldom wrote after two consonants; as in *pass, turn, black; not passe, turne, blacke.* Yet, after

r; it is used, as, *horse, nurse, purse*; not *hors, nurs, purs*. Also the words ending in *cre, gre, and tre*, sound the *e* before the *r*; as in these words, *acre, lucre, centre, sepulchre, tygre, maugre, mitre, lustre*; which are sounded as if written *aker, luker, center, sepulcher, tyger, mauger, miter, and luster*. *E final* also serves to soften *e* and *g*, as in *ace, place, lace, spite, truce, oblige, huge, age, &c.* If nouns in *e final* take *s* after them with an apostrophe before it, stands for *his*, as the *pope's eye*, or the *eye of the pope*; the *table's foot*, or the *foot of the table*: if without an apostrophe, it makes the plural number, as *popes, tables*. Words derived from those wrote with *e final*, seldom retain it, as in *writing, loving, doing, &c.* not *writing, loveing, or doeing*; except in the terminations *ge* and *ce* before *able*, as in *changeable, peaceable, &c.* *E* should not be written after a diphthong, in these words, *vain, main, gain, fear, know, &c.* not *vaine, maine, gaine, &c.* *E final* is annexed, but not sounded in those words which would otherwise end with *i, o, or u*; as in *die, foe, shoe, true, virtue, &c.*; but there are some exceptions, as *do, so, to, &c.* Lastly, There are some words in which the *final e* doth not lengthen the sound, as *give, live, some, one, done, &c.*

F in plurals is changed into *v*; as *wife, wives; staff, slaves.*

G is not sounded in *sign, reign, gnaw, gnat, assign, design, seignior, seraglio, phlegm, &c.* *G* is sounded soft in *gender, ginger, and gipsy*; but hard in *Gibson, Giberah, Gilboah, Gethsemane*; and hard also in these proper names, *Gibson, Gilman, and Gilbert*; and likewise in these common words, *gelt, geld, gird, gimp, geese, gander, gabble, gather, gild, &c.* Observe, That if *g* be hard with a long vowel, *ue* is joined and pronounced in the same syllable; as in *plague, Prague, Hague, rogue, league, dialogue, catalogue, &c.*

Gh in the end of some words, where *au* or *ou*, goes before, hath the sound of *ff*, as in *tough, rough, cough, laugh*, sounded as if *tuff, ruff, coff, lass*; but *huff, cuff, snuff*, and *buff*, must be so written. — *Gh* is not sounded in *mighty, though, through, daughter, and Vaughan*.

H hath place, but no sound, in *chronicle, Christ, ghost, John, Rhine, schedule, and schism, &c.* *H* is not sounded at the end of words, if it be alone; but with *ic* before it, it is sounded, as *snatch, watch, &c.*

I is not founded in *adieu*, *juice*, *venison*, *fruit*, *bruise*, *Salisbury*: it is founded like *ee* in *oblige*, *magazine*, and *machine*, &c. *I* is founded long in proper names ending in *iah*, as *Jeremiah*, *Hezekiah*; but short in *A-ri-el*, and *Mi-ri-am*.—*I* is founded like *u* in *first*, *dirt*, *bird*, &c.

K is nearly allied in sound with *c*; but to know when to use one, and when the other, *note*, that *c* hath the force of *k*, only before *a*, *o*, *oo*, and *u*, and those two consonants *l* and *r*; and therefore we must not write *kare*, for *care*; *kow*, for *cow*; *krown*, for *crown*: and the use of *k* is only before *e*, *i*, and *n*; wherefore we must write, *keep*, *key*, *knight*, *kill*, &c. not *ceep*, *cey*, *cnight*, nor *cill*: but the words *calander*, *Catherine*, are wrote sometimes *kalender*, *Katherine*. *K* is written after *c* only in pure English words, such as *back*, *deck*, *sick*, &c.; for the best authors have omitted it in words derived from the Greek and Latin, such as *public*, *muse*, *physic*, &c.

L is not founded in *calf*, *half*, *chalk*, *stalk*, *walk*; those words being pronounced as if written, *case*, *hase*, *chauk*, *stauk*, *wauk*. Neither is *l* pronounced in *Bristol*, *Holborn*, *Lincoln*, *salmon*, or *chaldron*; these are founded as if writ *Bristow*, *Hoborn*, *Lincon*, *sammon*, and *chaudron*; nor in *colonel*, where the first *l* hath the sound of *rr*, as *corronel*.

In the word *accompt*, *mp* is founded like *un*.

N is not heard in *autumn*, *lime-kiln*, *solemn*, *limn*, *hymn*, *column*, and *condemn*.

O is not founded in *people*, *feoffe*, *basen*, *mutton*, *yeoman*, *mason*, *righteousness*, *bacon*, *jeopardy*, and *crimson*.—*O* sometimes sounds like *oo*; as in *doing*, *moving*, *proving*, &c. *O* is not heard in *damofel*, *carrion*; which are pronounced as if writ *damsel*, *carrin*.—*O* is sometimes founded like *i*: as in *women* and *flagon*, pronounced as if *wimmen* and *flagin*. And sometimes *O* is founded as *u*; as in *money*, *conduit*, *conjure*, *attorney*, *Monmouth*, &c. being heard as if writ *mune*, *cundit*, *cunjure*, *atturney*, *Munmouth*, &c.; and it is founded like *oo* in *do*, *so*, *prove*, *move*, &c.

P is written, but not founded, in *empty*, *presumptuous*, *psalm*, *sumpter*, *attempt*, *psalter*, and *symptom*; also in *sumptuous*, *contemptuous*, *receipt*, and *consumptive*, &c.

Ph hath the sound of *f*, when together in one syllable;

ble; as in *philosophy*, *physician*, *Asaph*, and *elephant*; but we must not write *filosophy*, *fysician*, nor *Asaf*, or *elefant*: *Ph* are parted in *shep-herd*, *up-bold*, and in *Clap-ham*; and other such compounded words.

After *Q* always follows *u* in all words; and in some French and Latin words they have the sound of *k*; as in *risque*, *liquor*, *catholique*, *banquet*, *conquer*, *masquerade*, *chequer*; pronounced as *risk*, *likker*, *catholic*, *banket*, &c. to which add *oblique*, *relique*, *antique*, &c. which are sounded as if written *oblike*, *relike*, *antike*, &c.

S is not sounded in *island*, *viscount*, *isle*, and *Liste*; which are pronounced as if wrote *iland*, *vicount*, *ile*, and *Lile*.

S at the end of words, sounds hard like *z* in words of the plural number, and in words of the third person; as *names*, *worms*, *he reads*, *she hears*. *S* sounds hard in some words that terminate in *sion*, as in *circumcision*, *evasion*, *delusion*; but after a consonant soft, as in *conversion*, *commis-sion*, *dimension*. *S* is likewise sounded hard in these words, *raise*, *praise*, *chaise*, *cheese*, *these*, *compose*, *expose*, *bruise*, *refuse*, *applause*, *clause*, *wisdom*, *casement*, and *damosel*.

Th sounds fine in *thin*, *think*, and *wrath*, and is sounded hard in *thee*, *then*, *they*, *that*, *blithe*, *tithe*, and *sithe*; also in *mother*, *brother*, *hither*, *thither*; and in *loath*, *clothe*, and *clothier*, &c.

Ti before a vowel or diphthong, hath the sound of *si*, or *sh*; as in *patience*, *dictionary*, *Gratian*, *oblation*, *nation*, *translation*; except when *s* goes just before it, as in these words, *question*, *fustian*, *bastion*, *combustion*, and *celestial*, *bestial*, &c. But in some words of Hebrew and Greek, *ti* retains its natural sound; as in *Shealtiel*, *Phathiel*, *Shephatiah*, *Cotitria*, *Adramyttium*, and the like; and in the English derivatives, *mightier*, and *mightiest*, *emptiest*, *emptied*, *pi-ti-able*, &c.

U is sounded like *i* in *bury*, *birry*; *busy*, *bizzy*; *business*, as *bizness*. *U* is sometimes written after *g* without being sounded, as in *guide*, *guard*, &c. It is also silent in the words *buy*, *build*, *conduit*, *circuit*, *labour*, *favour*, *honour*, &c.; but it is sounded in others, as *anguish*, *language*, *Montague*, &c.

W is not sounded in *answer*, *sword*, *where*, *sworn*, &c.; neither is it heard before *r* in *wrap*, *wrath*, *wrong*, *wretch*, *wreath*, *wrangle*, *wriggle*, &c.

Wh belong to words purely English; as *what*, *when*, *where*, and *wheel*.

X is founded as z in *Xenophon*, *Xerxes*, *Xenocrates*, and *Xantippe*.

Y is either a vowel or consonant, as hinted before. A vowel in *my*, *by*, *fly*, *thy*; and sometimes, when a vowel, it hath the sound of *ee*, as in *worthily*, *Christianity*, *liberty*, *formerly*, *formally*, *Normandy*, and *Dorothy*. In derivative English words, having the termination *ing*, y is used in the middle of the word, as in *buying*, *dying*, *burying*, *marrying*, &c.

The diphthongs *ai* and *ay* have the sound of *a*, in *air*, *fair*, *pair*, *may*, *slay*, *play*; but *a* is lost in *Calais*, (a town in France), and pronounced separately in *Sinai*, (a mountain of Arabia).

Ei and *ey*, are sounded like *a* in *eight*, *streight*, *neighbour*, *heir*, *veil*, and *convey*; like *e* in *key*, and like *i* in *seight*.

Oi and *oy*, have a sound peculiar to themselves; as in *oil* and *oyster*; but make no diphthong in the derivatives, *going*, *doing*, &c.

Au and *aw* commonly keep a proper sound; as in *augur*, *austere*, *daw*, *marw*, *saw*, &c.; but *u* is lost in *aunt* and *gauger*, being sounded as *ant* and *gager*; they make no diphthong in *Em-ma-us*, and *Ca-per-na-um*.

Eu and *ew* have an united sound in most words, as in *seud*, *brew*, *new*, and *grew*; but *eu* is no diphthong in *Zac-che-us*, and *Bar-ti-me-us*.

Ou is expressed in *soul*, *soul*, *proud*, *loud*; and *ow* in *how*, *cow*, and *now*; but *ou* sounds like *oo*, in *soup*, (a French dish), and *Couper*, (a man's name), which are sounded as if *soop*, and *Cooper*.

Ee is no diphthong in *Be-e-rites*, *Be-er-she-ba*, and in words beginning with *re*, or *pre*; as *re-en-ter*, *pre-e-mi-nence*; in *Beelzebub* one of the *e*'s is not sounded.

Oo is properly sounded in *cool*, *fool*, *pool*, *root*, and *tool*, but hath the sound of *u* in *foot* and *foot*; it makes no diphthong in *Co-os*, *co-operate*.

Ea sounds like *e* in *sea*, *pea*, *seam*, *ream*, *bread*, *head*, *lead*, *dead*, *leather*, *feather*, *heaven*, *leaven*, and *creature*; it is no diphthong in *ven-ge-ance*, *mis-cre-ant*, or any Hebrew, Greek, or Latin words; as in *Kadesh-Bar-ne-a*, *Kir-jath-je-a-rim*, nor in *Ce-sa-re-a*, *i-de-a*, *o-ce-an*, *re-al*, *be-a-ti-tude*, *Cre-a-tor*; nor in words beginning with *pre*, as *pre-am-ble*, &c.

Eo is no diphthong in *dunge-on*, *hide-ous*, *mete-or*, *pige-on*, *the-o-ry*, &c.

Oa is founded as *o* in *goat*, *boat*, and *coat*; it is founded broad as *au*, in *broad* and *groat*; but is no diphthong in *Goa*, (a city in India), or in the Hebrew words *Zoan*, *Zoar*, and *Gilboa*.

Je before a single consonant, sounds like *ee*, as in *brief*, *chief*, and *thief*; but if before two consonants it sounds like *e*, as in *friend*, *field*; but at the end of English words, the *e* is not heard, as in *die*, *signify*; it is no diphthong in *A-bi-e-zer*, *E-li-a-zer*, nor in the English words *di-er*, *car-ri-er*, *clo-thi-er*; nor in words derived from the Latin, as *cli-ent*, *orient*, *qui-et*, and *sci-ence*.

Ui is founded as *u* in *juice*, *fruit*, and *suit*; but *u* is lost in *conduit*, *build*, and *guise*; and is no diphthong in *Je-su-ite*, *ge-nu-ine*, and *fru-i-tion*.

Æ and *OE* are not English diphthongs; they are used in *Æsop*, *Æneas*, *Ætna*, *Cæsar*, *Oedipus*, *Oeconomy*, and sound like *e*; but in common words they are neglected; as in *equity*, *female*, and *tragedy*, though derived of *aquitas*, *femina*, and *tragedia*.

Of syllables, and their division, being the art of spelling.

A Syllable is a taking letters together, and uttering them in one breath, as *vir-tue*, so that *virtue*, being thus divided, or taken asunder, makes two syllables, viz. *vir* and *tue*; which, put together, form the word *virtue*. And many times a vowel, or a diphthong, of themselves, make a syllable; as in *a-bate*, *e-ve-ry*, *i-dle*, *o-ver*, *u-su-ry*, and in *au-ger*, *Eu-pace*, *ow-ner*, *ai-der*, *cy-ster*, *Ea-son*, *oa-ten*. No syllable can be made, be there never so many consonants, or so few, without the aid of a vowel or diphthong.

The longest monosyllables we have in the English, are *length*, *strength*, and *freight*; which could not be founded without the vowel *e* or *i*.

The art of spelling may be reduced to these four following general rules or heads.

1st, When a consonant comes between two vowels, in dividing the words into syllables, the consonant is joined to the latter vowel; as in *sta-ture*, *na-ture*, *de-li-ver*, *u-ni-ty*, &c. except compound words which terminate in *ed*, *en*, *est*, *eth*, or *ing*, *ish*, and *ous*; as *coast-ed*, *gold-en*, *know-est*, *know-eth*, *bear-er*, *fool-ing*, *bar-bar-ous*, *ra-ven-ous*, and *sub-urbs*.

2^{dly}, When two consonants come together in the middle

dle of a word, they are to be parted, if not proper to begin a word; as *num-ber, stran-ger, for-tune, &c.* not *numb-er, strang-er, fort-une*: when the same consonant is doubled in a word, the first belongs to the foregoing, the latter to the following syllable, as in the rule above, and in these words, *Ab-ba, ac-cord, an-no, ad-der, &c.*

3dly, *Consonants* that can begin words, must not be parted in the middle; as *a-gree, be-flow, re-frain, &c.* not *ag-ree, beflow, refrain*.—These *consonants* may begin words, viz. *bl, br, ch, cr, dr, dw, fl, fr, gh, gl, gr, kn, &c.* as *blunt, break, chaw, cry, draw, dwell, flesh, ghost, &c.*

4thly, When two vowels come together, not making a diphthong, they must be divided, as in *vi-al, va-li-ant, Li-o-nel, du-el, cru-el, me-te-or, and La-o-di-ce-a.*

Some particular notes.

L is doubled in words of one syllable; as *well, tell, swell, hall, wall, fall, will, hill, mill, &c.* But in words of more than one syllable, the word always terminates with single *l*; as *angel, Babel, hurtful, beautiful, and dutiful*. Neither must *l* be doubled in *alway, also, although*; not *allway, allso, althlough, &c.* But words accented on the last syllable, must be excepted from the rule above, viz. *install, recall, inroll, rebell, repell.*

Y must be used before the termination *ing*, as *buying, lying, carrying, marrying, paying, staying, burying, &c.*

The long *s* must never be used at the end of a word, or immediately after a short or small *s*.

X should be used instead of *ct*, where it appears to have been in the original; as *reflexion, connexion*, rather than *reflection, or connection*.

Remember, that if you cannot write out the whole word at the end of the line, you must break it off at the end of a syllable, thus _____ *con-*
demn; not thus _____ *cond-*
emn. Again _____ *dis-*
charge; not _____ *disc-*
harge.

C must not be put between two consonants; as *think*, not *thinck*; *thank*, not *thanck*; *brink*, not *brinck*; but if a vowel goes before *c*, you must write *c* before *k*, as *brick, thick, stick, &c.*

Ph must be retained in words of a foreign original; as *prophet*, not *proset*.

Of *S* and *C*. Some people may easily drop into error by mistaking *S* for *C*, as in the beginning of the following words, where *C* hath the perfect sound of *S*, though *C* must undoubtedly be written, *viz.* in

| | | | |
|-----------|-----------|----------|--------|
| Ceiling | Cinnamon | Cell | Ceruse |
| Celestial | Ceremony | Celerity | Centre |
| Civet | Cellar | Cypress | Cinque |
| Certain | Censure | Circle | Cipher |
| Cymbal | Censor | Circuit | City |
| Cistern | Cease | Cement | Citron |
| Centurion | Celebrate | | |

But these words must be written with *S*, viz.

| | | | |
|----------|---------|----------|----------|
| Science | Sceptre | Scarcity | Sciatica |
| Schedule | Scheme | Schism | Scythian |

The following words should be wrote
with *ti* with *fi*

| | |
|---------------|---------------|
| Contention | Confusion |
| Action | Occasion |
| Contradiction | Contusion |
| Attention | Oppression |
| Benediction | Allusion |
| Apparition | Ascension |
| Concoction | Aversion |
| Declaration | Aspersion |
| Ambition | Commission |
| Contrition | Comprehension |
| Oration | Circumcision |
| Oblation | Conclusion |

The following words should be spelt thus,

| | |
|---------------------------------|-------------------------------------|
| Passion, <i>not</i> pashon. | Salisbury, <i>not</i> Salsbury. |
| Fashion, <i>not</i> fation. | Leicester, <i>not</i> Lester. |
| Cushion, <i>not</i> cution. | Shrewsbury, <i>not</i> Shrosbury. |
| Gloucester, <i>not</i> Gloster. | Carlisle, <i>not</i> Carlile. |
| Worcester, <i>not</i> Worster. | Westminster, <i>not</i> Westmister. |

Another qualification in spelling, is rightly to distinguish words of the *same sound*, though widely different in their sense and signification : such as these that follow, *viz.*

A Bel, Cain's brother
A ble, to do a thing
A bell, to ring
Accidents, chances
Accidence, a book
Acre, of land
Acorn, of an oak

Achor,

| | |
|---------------------------------------|---------------------------------------|
| <i>Achor</i> , a valley of that name | <i>Assistance</i> , help |
| <i>Advice</i> , counsel | <i>Assistants</i> , helpers |
| <i>Advise</i> , to counsel | <i>Augur</i> , a soothsayer |
| <i>Account</i> , esteem | <i>Augre</i> , to bore with |
| <i>Accompt</i> , or reckoning | <i>Axe</i> , to cut with |
| <i>Ale</i> , a drink | <i>Acts</i> of parliament |
| <i>Ail</i> , trouble | <i>Austere</i> , severe |
| <i>All</i> , every one | <i>Oyster</i> , a shell-fish |
| <i>Awl</i> , for shoemakers | B |
| <i>Alley</i> , a narrow place | <i>Babel</i> , the tower |
| <i>Ally</i> , a friend or confederate | <i>Babble</i> , to prate |
| <i>Allay</i> , to give ease | <i>Bacon</i> , hog's flesh |
| <i>Alloy</i> , base metal | <i>Baken</i> in the oven |
| <i>Altar</i> , for sacrifice | <i>Beckon</i> , to make a sign |
| <i>Alter</i> , to change | <i>Beacon</i> , to be fired on a hill |
| <i>Ale-hoof</i> , an herb | <i>Bail</i> , a surety |
| <i>Aloof</i> , at a distance | <i>Bale</i> , of goods |
| <i>Allowed</i> , approved | <i>Bald</i> , without hair |
| <i>Aloud</i> , to speak so | <i>Barw'd</i> , cried out |
| <i>Amiss</i> , wrong | <i>Ball</i> , to play with |
| <i>Amis</i> , or mistress | <i>Bawl</i> , to cry aloud |
| <i>Ant</i> , a pismire | <i>Barbara</i> , a woman's name |
| <i>Aunt</i> , a father's sister | <i>Barbary</i> , in Africa |
| <i>Anchor</i> , of a ship | <i>Barberry</i> , a fruit |
| <i>Anker</i> , a runlet | <i>Bare</i> , naked |
| <i>A peal</i> , of bells | <i>Bear</i> , a beast, or to bear |
| <i>Appeal</i> , to higher powers | <i>Bays</i> , of bay-trees |
| <i>Appear</i> , to be seen | <i>Baize</i> , cloth of Colchester |
| <i>A peer</i> , a lord | <i>Base</i> , vile |
| <i>Aray</i> , good order | <i>Bast</i> , in music |
| <i>Array</i> , to clothe | <i>Belly</i> , part of the body |
| <i>A rose</i> , to smell to | <i>Belie</i> , to speak falsely |
| <i>Arose</i> , did arise | <i>Be</i> , they are |
| <i>Are</i> , they be | <i>Bee</i> , that makes honey |
| <i>Air</i> , we breathe | <i>Beer</i> , to drink |
| <i>Heir</i> , to an estate | <i>Bier</i> , to carry the dead on |
| <i>Arrant</i> , notorious | <i>Bell</i> , to ring |
| <i>Errand</i> , a message | <i>Bel</i> , an idol |
| <i>Arrows</i> , to shoot | <i>Berry</i> , a small fruit |
| <i>Arras</i> , hangings | <i>Bury</i> , the dead |
| <i>Harrafs</i> , to fatigue | <i>Blue</i> , a colour |
| <i>A scent</i> , or smell | <i>Blew</i> , as the wind |
| <i>Ascent</i> , a going up | <i>Board</i> , a plank |
| <i>Assent</i> , agreement | <i>Bor'd</i> , a hole |

Boar, a beast
Bore, to make hollow
Boor, a country-fellow
Bold, confident
Bowld, at the jack
Bolt, the door
Boult, the meal
Beau, a fop
Bow, to bend, or the bow
Bough, of a tree
Boy, a lad
Buoy, of an anchor
Bread, to eat
Bred, brought up
Breeches, to wear
Breaches, broken places
Bruit, a report
Brute, beast
Burrow, for coney
Borough, a corporation
By, near
Buy, with money
Brews, he breweth
Bruise, a hurt
Brewis, of fat and bread
Buss, a fishing vessel
Buz, the noise of a fly

C

Cain, that killed his brother
Cane, to walk with
Caen, in Normandy
Calais, in France
Chalice, a cup
Call, by name
Cawl, or suit
Cannon, a great gun
Canon, a rule
Canon, of a cathedral
Capital, great or chief
Capitol, a tower in Rome
Career, full speed
Carrier, of goods
Cellar, for liquors

Seller, that selleth
Censer, for incense
Censor, a reformer
Censure, to judge
Centaury, an herb
Century, an hundred years
Centry, a centinel, a soldier
on guard
Char, a fish
Chair, to sit in
Chare, a job of work
Champaine, wine of France
Champaign, a wide field, or
summer's expedition.
Choler, rage or anger
Collar, of the neck
Coller, of beef or brawn
Ceiling, of a room
Sealing, with a seal
Cittern, for music
Citron, a fruit
Choir, of a cathedral
Quire, of paper
Clerk, a clergyman
Clerk, of a parish
Clause, part of a sentence
Claws, of a beast or bird
Coat, a garment
Cote, for sheep
Comb, for the hair
Come, hither
Commit, to do
Comet, a blazing star
Common, usual
Commune, or converse
Condemn, to death
Contemn, to despise
Council, of the king
Counsel, advice
Coarse, not fine
Course, to be run
Cornhill, a street in London
Cornwall, a county

C

Cow'd

| | |
|--|---|
| <i>Cou'd</i> , or could | <i>Doe</i> , a female deer |
| <i>Cud</i> , to chew as beasts | <i>Dough</i> , paste |
| <i>Current</i> , a passing or running stream | <i>Don</i> , a Spanish lord |
| <i>Courant</i> , a messenger, or newspaper | <i>Done</i> , acted |
| <i>Currants</i> , fruit | <i>Dun</i> , of colour |
| <i>Crick</i> , in the neck | <i>Dolphin</i> , a fish |
| <i>Creek</i> , of the sea or river | <i>Dauphin</i> , the French king's eldest son |
| <i>Cousin</i> , a relation | <i>Devices</i> , inventions |
| <i>Cozen</i> , to cheat | <i>Devizes</i> , a town in Wiltshire |
| <i>Cymbal</i> , a musical instrument | <i>Doer</i> , that doth |
| <i>Symbol</i> , a mark or sign | <i>Door</i> , of a house |
| <i>Cypress</i> , a tree | <i>Dragon</i> , a beast |
| <i>Cyprus</i> , an island | <i>Dragoon</i> , a soldier |
| <i>Cruse</i> , for oil | <i>Draught</i> , of drink |
| <i>Cruise</i> , by the sea-coast | <i>Drought</i> , dryness |
| <i>Cygnets</i> , a young swan | <i>Dolour</i> , grief or pain |
| <i>Signet</i> , a seal | <i>Dollar</i> , a piece of money |
| | <i>Demure</i> , sober |
| | <i>Demur</i> , a stop or doubt |

D

E

| | |
|----------------------------------|--------------------------------|
| <i>Dane</i> , of Denmark | <i>Ear</i> , of the head |
| <i>Deign</i> , to vouchsafe | <i>E'er</i> , ever |
| <i>Dam</i> , stopping water | <i>Year</i> , twelve months |
| <i>Damn</i> , to condemn | <i>Early</i> , betimes |
| <i>Dame</i> , a mistress | <i>Yearly</i> , every year |
| <i>Dear</i> , of price | <i>Earth</i> , the ground |
| <i>Deer</i> , in a park | <i>Hearth</i> , of the chimney |
| <i>Deceased</i> , dead | <i>Easter</i> , the festival |
| <i>Diseased</i> , sick | <i>Esther</i> , a woman's name |
| <i>Decent</i> , becoming | <i>Enter</i> , to go in |
| <i>Descent</i> , going down | <i>Inter</i> , to bury |
| <i>Dissent</i> , to disagree | <i>Elder</i> , not the younger |
| <i>Deep</i> , low in the earth | <i>Elders</i> , a tree |
| <i>Diepe</i> , a town in France | <i>Eaten</i> , or swallowed |
| <i>Deser</i> , to put off | <i>Eaton</i> , a town's name |
| <i>Differ</i> , to disagree | <i>Eminent</i> , famous |
| <i>Derbe</i> , a city of Asia | <i>Imminent</i> , over head |
| <i>Derby</i> , a town in England | <i>Enow</i> , in number |
| <i>Desert</i> , merit | <i>Enough</i> , in quantity |
| <i>Desart</i> , wilderness | <i>Earn</i> , to deserve |
| <i>Dew</i> , a falling mist | <i>Yarn</i> , woolen thread |
| <i>Due</i> , owing | <i>Tearn</i> , to pity |
| <i>Do</i> , to make | |

East,

| | |
|---|--------------------------------------|
| <i>East</i> , the wind | <i>Flue</i> , of a chimney |
| <i>East</i> , used in making bread | <i>Flew</i> , did fly |
| <i>Envy</i> , or hatred | <i>Fowl</i> , a bird |
| <i>Envoy</i> , a messenger | <i>Foul</i> , dirty |
| <i>Exercise</i> , labour or practice | <i>Francis</i> , a man's name |
| <i>Exorcise</i> , to conjure | <i>Frances</i> , a woman's name |
| <i>Err</i> , to mistake | <i>Frays</i> , quarrels |
| <i>Er</i> , brother to Onan, son of Judah | <i>Froise</i> , pancake with bacon |
| <i>Exant</i> , in being | <i>Frize</i> , a sort of cloth |
| <i>Extent</i> , distance | <i>Freeze</i> , with cold |
| | G |
| <i>Fain</i> , desirous | <i>Gall</i> , of a beast |
| <i>Feign</i> , to dissemble | <i>Gaul</i> , France |
| <i>Fair</i> , beautiful, or a market | <i>Garden</i> , of herbs |
| <i>Fare</i> , victuals | <i>Guardian</i> , an overseer |
| <i>Faint</i> , weary | <i>Genteel</i> , graceful |
| <i>Feint</i> , a pretence | <i>Gentile</i> , a Heathen |
| <i>Fourth</i> , in number | <i>Gentle</i> , mild |
| <i>Forth</i> , to go out | <i>Gesture</i> , carriage |
| <i>Feed</i> , to eat | <i>Jester</i> , a merry fellow |
| <i>Fee'd</i> , rewarded | <i>Groan</i> , with grief |
| <i>Fir</i> , wood | <i>Grown</i> , greater |
| <i>Eur</i> , or hair | <i>Guilt</i> , of sin |
| <i>Felon</i> , a criminal | <i>Gilt</i> , with gold |
| <i>Fellon</i> , a whitlow | <i>Greater</i> , bigger |
| <i>File</i> , of steel | <i>Grater</i> , for nutmegs |
| <i>Foil</i> , put to the worst | <i>Grave</i> for the dead |
| <i>Fly</i> , as a bird | <i>Greave</i> , armour for the leg |
| <i>Fly</i> , an insect | <i>Guess</i> , to imagine |
| <i>Fillip</i> , with the finger | <i>Guest</i> , one entertained |
| <i>Philip</i> , a man's name | <i>Gluttonous</i> , greedy |
| <i>Flower</i> , of the field | <i>Glutinous</i> , sticking as pitch |
| <i>Flour</i> , meal | <i>Great</i> , large |
| <i>Floor</i> , of a room | <i>Grate</i> , for coals, &c. |
| <i>Follow</i> , to come after | <i>Greet</i> , to salute |
| <i>Fallow</i> , ground not ploughed | <i>Graze</i> , to eat grass |
| | <i>Grays</i> , a town |
| <i>Find</i> , to find any thing | <i>Groat</i> , four pence |
| <i>Fin'd</i> , amerced | <i>Grot</i> , a cave |
| <i>Fiend</i> , a devil | <i>Galleys</i> , ships with oars |
| <i>Flay</i> off the skin | <i>Gallows</i> , for criminals |
| <i>Flea</i> , a vermin | H |
| <i>Flee</i> , to escape | <i>Hare</i> , in the fields |

| | |
|--|---------------------------------------|
| <i>Hair</i> , of the head. | <i>Hoop</i> , for a tub |
| <i>Heir</i> , to an estate | <i>Whoop</i> , or ho ! lo ! |
| <i>Harsh</i> , severe | <i>Hugh</i> , a man's name |
| <i>Hatch</i> , minced meat | <i>Hue</i> , of colour |
| <i>Haven</i> , a harbour | <i>Hew</i> , with an axe |
| <i>Heaven</i> , a place of happiness | I |
| <i>Heart</i> , of the body | <i>I</i> , I myself |
| <i>Hart</i> , in the woods, or an overgrown buck | <i>Eye</i> , to see with |
| <i>Herd</i> , of cattle | <i>Idle</i> , lazy |
| <i>Heard</i> , did hear | <i>Idol</i> , an image |
| <i>Hard</i> , not soft, or difficult | <i>I'll</i> , I will |
| <i>Here</i> , in this place | <i>Ile</i> , of a church |
| <i>Hear</i> , with the ears | <i>Isle</i> , an island |
| <i>High</i> , lofty | <i>Oil</i> , of olives |
| <i>Hie</i> , away, make haste | <i>Employ</i> , in work |
| <i>Hoy</i> , a small ship | <i>ImPLY</i> , to signify |
| <i>Him</i> , that man | <i>In</i> , within |
| <i>Hymn</i> , a spiritual song | <i>Inn</i> , for travellers |
| <i>Hail</i> , congealed rain | <i>Incite</i> , to stir up |
| <i>Hale</i> , the ship | <i>Insight</i> , knowledge |
| <i>Hall</i> , in a house | <i>Ingenious</i> , of quick parts |
| <i>Haul</i> , pull | <i>Ingenuous</i> , candid |
| <i>Heel</i> , of the foot | <i>Iron</i> , metal |
| <i>Heal</i> , to cure | <i>Irony</i> , speaking by contraries |
| <i>He'll</i> , he will | <i>Itch</i> , a distemper |
| <i>Higher</i> , taller | <i>Hitch</i> , to catch hold |
| <i>Hire</i> , wages | K |
| <i>His</i> , of him | <i>Ketch</i> , a ship |
| <i>Hiss</i> , as a snake, or to deride | <i>Catch</i> , to lay hold of |
| <i>Hoar</i> , frost | <i>Kill</i> , to slay |
| <i>Whore</i> , a lewd woman | <i>Kiln</i> , for lime |
| <i>Hole</i> , or hollowness | <i>Kind</i> , good-natured |
| <i>Whole</i> , entire | <i>Coin'd</i> , money |
| <i>Ho ! lo !</i> to call | <i>Knave</i> , dishonest |
| <i>Hallow</i> , to make holy | <i>Neve</i> , of a wheel |
| <i>Hollow</i> , having a cavity | <i>Knight</i> , by honour |
| <i>Holy</i> , pious | <i>Night</i> , darkness |
| <i>Holly</i> , entirely | <i>Kennel</i> , for dogs |
| <i>Holly</i> , a tree | <i>Channel</i> , for water |
| <i>Home</i> , one's house | L |
| <i>Whom ?</i> what man | <i>Laid</i> , placed |
| <i>Holm</i> , holly | <i>Lade</i> , the water |

| | |
|---|------------------------------------|
| <i>Lane</i> , a narrow street | <i>Mail</i> , armour |
| <i>Lain</i> , did lie | <i>Manner</i> , custom |
| <i>Latin</i> , a tongue | <i>Manor</i> , a lordship |
| <i>Latten</i> , tin | <i>Manure</i> , to dung |
| <i>Ladder</i> , to ascend | <i>Market</i> , to buy or sell in |
| <i>Lather</i> , made with soap | <i>Mark it</i> , note it |
| <i>Lattice</i> , of a window | <i>Marsh</i> , low ground |
| <i>Lettice</i> , a woman's name | <i>Mash</i> , for a horse |
| <i>Lettuce</i> , a sallad | <i>Mesh</i> , of a net |
| <i>Lease</i> , of a house | <i>Martin</i> , a man's name |
| <i>Leash</i> , three | <i>Marten</i> , a bird |
| <i>Lees</i> , of wine | <i>Mead</i> , a meadow |
| <i>Leese</i> , an old word for lose | <i>Mede</i> , one of Media |
| <i>Leaper</i> , that jumpeth | <i>Mean</i> , of low value |
| <i>Leper</i> , one leprous | <i>Mien</i> , carriage or aspect |
| <i>Lessen</i> , to make less | <i>Meat</i> , to eat |
| <i>Lesson</i> , to be read | <i>Meet</i> , fit |
| <i>Least</i> , smallest | <i>Mete</i> , to measure |
| <i>Left</i> , for fear | <i>Message</i> , business |
| <i>Lethargy</i> , sleepiness | <i>Messuage</i> , a house |
| <i>Liturgy</i> , church-service | <i>Mews</i> , for hawks |
| <i>Lier</i> , in wait | <i>Muse</i> , to meditate |
| <i>Liar</i> , that tells lies | <i>Mighty</i> , powerful |
| <i>Limb</i> , a member | <i>Moiety</i> , half |
| <i>Limn</i> , to paint | <i>Mile</i> , measure |
| <i>Line</i> , length | <i>Moil</i> , labour |
| <i>Loin</i> , of veal | <i>Might</i> , strength |
| <i>Liquorish</i> , fond of dainties | <i>Mite</i> , in cheese |
| <i>Liquorice</i> , a plant, or its root | <i>Moat</i> , a ditch |
| <i>Low</i> , humble | <i>More</i> , in the sun |
| <i>Lo!</i> behold | <i>Moan</i> , to lament |
| <i>Lose</i> , to suffer loss | <i>Mown</i> , cut down |
| <i>Loose</i> , to let go | <i>More</i> , in quantity |
| <i>Lower</i> , to let down | <i>Moor</i> , a black |
| <i>Lour</i> , a frown | <i>Mower</i> , that moweth |
| <i>Loath</i> , to abhor | <i>Moor</i> , barren ground |
| <i>Loth</i> , unwilling | <i>Morter</i> , made of lime |
| M | <i>Mortar</i> , to pound in |
| <i>Made</i> , finished | <i>Mole</i> , vermin |
| <i>Maid</i> , a young woman | <i>Mould</i> , to cast in |
| <i>Main</i> , chief | <i>Muscle</i> , a shell-fish |
| <i>Mane</i> , of a horse | <i>Muzzle</i> , to cover the mouth |
| <i>Male</i> , the he | |

N

Nay, denial
Neigh, as a horse
Neither, none of the two
Nether, lower
New, not old
Knew, did know
Naught, bad
Nought, nothing
Nigh, near
Nyi, a man's name
Nice, curious
Niece, a brother's daughter
Not, denying
Knot, to tie
Note, mark
Note, of one's hand
Nose of the face
Knows, understands
No, a denial
Know, to understand
Neal, to harden glass
Kneel, on the knees
None, not one
Known, understood
News, tidings
Noose, a snare

O

Oar of a boat
Ore, crude metal
O'er, over
Off, cast off
Of, belonging to
Our, belonging to us
Hour of the day
Oh ! alas
Owe, in debt
One in number
Won, at play
Own, to acknowledge
Order, rule
Ordure, dung

P

Pair, a couple

Pare, cut off
Pain, anguish
Pane, of glass
Pear, a fruit
Pattin, for a woman
Patent, a grant
Peer, a lord
Pier, of Dover
Peter, a man's name
Petre, salt
Pail for water
Pale of countenance
Pale, a fence
Pall, for a funeral
Paul, a man's name
Plait the hair
Plate, metal
Place, room
Plaise, a fish
Parson of the parish
Person, any man
Pole for hops
Poll of the head
Pool of water
Pore with the eyes, or of the skin
Poor, necessitous
Palate of the mouth
Pallet, bed
Palliate, to cover or hid
Point, a stop
Pint, half a quart
Posy, a nosegay
Poesy, poetry
Power, mighty
Pour, as water
Prey, a booty
Pray, to beseech
Profit, gain
Prophet, a foreteller
Prophecy, a foretelling
Prophecy, to foretel
Practice, exercise

Practise,

Practise, to exercise
Presence, being here
Presents, gifts
Princes, the king's sons
Princesses, the king's daughters
Please, to content
Pleas, excuses or defences
Precedent, an example
President, chief
Principal, chief
Principle, the first rule

Q

Quire of paper
Choir of fingers
Queen, the king's wife
Quean, a harlot

R

Rack, to torment
Wreck, of a ship
Arrack, a strong liquor
Rain, water
Reign of the king
Rein of a bridle
Rays of the sun
Raise, lift up
Raisin, a fruit
Reason, argument
Race, to run
Raze, to demolish

Rice, grain
Rise, to get up
Red in colour
Read the book
Reed growing in the water
Relic, a remainder
Relict, a widow
Roe, of a fish or a deer
Row the boat
Right, not wrong
Rite, a ceremony
Write with a pen
Wright, a wheelwright

Reddish colour
Radish, a root
Rear, set up
Rere, behind
Arrear, of rent
Rest, quiet
Wrest, to pervert
Roof, the top of an house
Ruff for the neck
Rough, not smoothe
Rie, corn
Rye, a town in Suffex
Wry, crooked
Ring the bells
Wring the hands
Ream of paper
Rime, a fog or mist
Rhyme, verse
Rind of cheese
Rode, did ride
Road, the highway
Row'd, did row
Room, part of a house
Rome, the name of a city
Roam, to wander
Rheum, a humour
Rote, got by heart
Wrote, did write
Wrought, did work

S

Savour, taste or smell
Saviour, that saves
Satiety, fulness
Society, company
Sheep, a beast
Ship, for the sea
Sight, view
Cite, to summons
Site, situation
Sail of a ship
Sale of goods
Sea, the ocean
See with the eyes

Seam,

Seam, in a coat
Seem, appear
Seen, beheld
Scene, in a play
Seas, great waters
Seize, to lay hold of
Cease, to leave off
Sent, did send
Scent, a smell
Shew, to make appear
Shoe for the foot
Sink, sink down
Cinque, five
Slight, to despise
Slight, neglected
Sleight of hand
Shoar, a prop
Shore, the sea-coast
Serwer, a common drain
Shown, viewed
Shone, did shine
Slow, not quick
Sloe, fruit
Sow seed
Sew with a needle
Sue, at law
So, thus
Some, a part
Sum of money
Soul, or spirit
Sole, a fish
Soal of a shoe
Son of a father
Sun in the firmament
Sore, painful
Soar, aloft
Swore, did swear
Sword, a weapon
Spar'd, did soar
Stare, to look earnestly at
Stair, a step
Stile to get over
Style of writing

Sound, whole, firm : also
 noise
Swoon, to faint away
Soon, quickly
Statue, an image
Statute, a law
Stature, height
Stead, a place
Steed, a horse
Straight, not crooked
Strait, narrow
Succour, help
Sucker, a young sprig
Spear, a weapon
Sphere, a glob
 T
Then, at that time
Than, in comparison
Tame, gentle, not wild
Thame, a town in Oxford-
 shire
Tear, to rend
Tear of the eye
Tare, an allowance in
Tare, a vetch [weight
Tail of a beast
Tale, a story
Tiles for the house
Toils, nets
Toil, to labour
There, in that place
Their, of them
Thorough, complete
Throw a stone
Throne, of the king
Thrown, as a stone
Tide, a flowing water
Ty'd, made fast
Time of the day
Thyme, an herb
Team of horses
Teem, with child
Te, the preposition

| | | |
|-------|-------------------------|--------------------------|
| also | Two, likewise | Waste, to spend |
| | Two, a couple | Wait, to stay for |
| y | Toe of the foot | Weight, heaviness |
| | Tow, to draw | Wear, cloaths |
| | Tow to be spun | Ware, merchandise |
| | Told, as a story | Were, was |
| | Toll'd, as a bell | Where, what place |
| | Tour, a journey | Weigh, to poise |
| | Tower of a church | Wey, five quarters |
| | V | Whey, of milk |
| | Vacation, leisure | Weal, good |
| | Vocation, a calling | Wheal, from scourging |
| g | Veil, a covering | Wield, a sword |
| | Vale, between two hills | Weald, of Sussex or Kent |
| | Vain, foolish | Wen in the neck |
| | Vein of the body | When, at what time |
| | Vane, a weathercock | White of colour |
| | Value, worth | Wight, an island |
| ld | Valley, a vale | Whore, a lewd woman |
| ford. | Vial, a glass | Hoar, frost |
| | Viol, a fiddle | Witch, that conjures |
| | U | Which, who or what |
| | Your, of you | Whist, silence |
| in | Ewer, a bason | Wist, knew |
| ight | Ure, practice | Wood, of trees |
| | Use, practice | Wou'd, or would |
| | Use, to be wont | Y |
| | Ewes, sheep | Yea, yes |
| | W | Ye, yourselves |
| | Wade in the water | Ewe, a sheep |
| | Weigh'd in the scales | Yew, a tree |
| | Whale of the sea | You, yourselves |
| | Wail, lament | Yarn, made of wool |
| | Waist, the middle | Yearn, to pity |

*Of stops, marks, and points, used in reading and writing ;
with their places and significations.*

THESE are of absolute necessity; and great regard ought to be had to them, to avoid confusion and misconstruction, and for the better understanding of what we read and write ourselves; and are likewise of use to others who shall hear us read, or

or see our writing: they teach us to observe proper distances of time, with the necessary raising and falling of the tone or voice in reading, and the needful stops or marks to be used in writing, that we may understand it ourselves, and that our meaning may not be misunderstood, or misapplied by others.

Stops, or pauses, considered as intervals in reading, are no more than four; though there are other marks to be taken notice of, but to other purposes. The names of the four stops are a *comma*, *semicolon*, *colon*, and *period* or *full stop*; and these do bear to one another a kind of progression of time; for the *comma* signifies a stop of leisurely telling one, the *semicolon* two, the *colon* three, and the *period* four.

— They are made or marked thus;

Comma (,) at the foot of a word.

Semicolon (;) a point over the comma.

Colon (:) two points.

Period (.) a single point at the foot of a word.

, *Example of the comma*). There is not any thing in the world, perhaps, that is more talked of, and less understood, than the business of a happy life.

; *Example of the semicolon*). It is not a curse that makes way for a blessing; the bare wish is an injury; the moderation of Antigonus was remarkable.

: *Example of the colon*). A sound mind is not to be shaken with popular applause; but anger is startled at every accident.

. *Example of the period*). It is a shame, says Fabius, for a commander to excuse himself, by saying, I was not aware of it. A cruelty that was only fit for Marius to suffer, Sylla to command, and Catiline to act.

By the examples foregoing, we may easily note, that a *comma* is a note of a short stay between words in the sentence; and therefore the tenor of the voice must still be kept up.—The *semicolon* is a little longer, and the tone of the voice very little abated.—The *colon* signifies perfect sense, though not an end of the sentence; and the voice a little abated, or let fall.—The *period* denotes perfect sense, and the end of the sentence.

? When the question is asked, there is a crooked mark made over the *period* thus ? and is called a note of

of interrogation. *Example*, What could be happier than the state of mankind, when people lived without either avarice or envy? The time of pause for this stop, is the same with the semicolon.

! If a sudden crying out, or wondering be expressed, then this mark is made over the full stop, thus! and called a note of admiration, or exclamation. *Example*, Oh the astonishing wonders that are in the elementary world!

() If one sentence be within another, of which it is no part, then it is placed between two semicircles or parenthesis, made thus (). *Example*, Pompey, on the other side (that hardly ever spake in public without a blush) had a wonderful sweetness of nature. Again; Of authors be sure to make choice of the best, and (as I said before) to stick close to them. Once more; Honour thy father and mother, (which is the first commandment with promise), that it may be well with thee.—In reading a parenthesis, the tone must be somewhat lower, as a thing or matter that comes in by the bye, breaking in as it were on the main coherence of the period. The time is equal to a comma, and ought to be read pretty quick, least it detain the ear too long from the sense of the more important matter.

' *Apostrophe* is a comma at the head of letters, signifying some letter or letters left out for quicker pronunciation, as *I'll* for *I will*, *would'st* for *wouldest*, *shan't*, for *shall not*, *ne'er* for *never*, *is't* for *is it*, *'tis* for *it is*, *i'th'* for *in the*, *o'er* for *over*: or to denote a genitive case, as my father's house, my uncle's wife, &c.

ˆ *Accent* is placed over a vowel, to denote that the stress or sound in pronunciation is on that syllable.

˘ *Breve*, or a crooked mark over a vowel, signifies it must be sounded short or quick.

^ *Caret* signifies something is wanting, and is placed underneath the line, just where any thing, omitted by mistake, or forgetfulness, &c. should be brought in.

˘˘ *Circumflex* is of the same shape with the caret, but is placed over some vowel, to shew the syllable to be long, as *Eu-phra-tes*.

.. *Dialysis*, or *Diæresis*, or two points placed over two

two vowels, in a word, signifies they are to be parted, being no diphthong.

- *Hyphen*, or *note of connection*, is a straight line, which being set at the end of a line, shews that the syllables of that word are parted, and the remainder of it is at the beginning of the next line; and sometimes is used in compound words, as burnt-sacrifices, heart-breaking, soul-healing, book-keeper, &c. *N. B.* That when you have not room to write the whole word at the end of a line, but are obliged to finish it at the beginning of the next, such words must be truly divided, according to the rules of spelling; as, re-strain, not _____ re-strain. When the hyphen is placed over a vowel, it is properly a dash, and signifies the omission of *m* or *n*; it is much used in old Latin authors, and sometimes in English, especially in law-business. *Example*; It is very comēdable to write a good hand.

☞ *Index*, is a note like a hand, pointing to something very remarkable.

* *Asterisk*, or *star*, directs to some remark in the margin, or at the foot of the page. Several of them together denote something defective, or immodest, in that passage of the author.

† *Obelisk*, is a mark like a dagger, and refers to the margin, as the *asterisk*: and in dictionaries it signifies the word to be obsolete, or old, and out of use.

¶ *Paragraph*, denotes a division comprehending several sentences under one head.

§ *Section*, signifies the beginning of a new head of discourse, and is used in subdividing a chapter, or book, into lesser parts or portions.

[] *Brackets* or *Crotchets*, generally include a word or sentence explanatory of what went before; or words of the same sense, which may be used in their stead.

“ *Quotation*, or double comma reverse, is used at the beginning of the line, and shews what is quoted from an author to be his own words.

Thus much for pointing, stops, and marks; which, if carefully heeded and observed, will add grace and credit to your writing.

Of Abbreviations.

TO be ready in these, shews a dexterity in writing ; and is very necessary for dispatch : for by these we expeditionly express, or set down a word, shortening it, by making some initial letter or letters, belonging to the word, to express it ; as in the table following.

| | |
|---|--|
| <i>A.</i> for Answer, or After-noon | <i>Cent.</i> Centum |
| <i>A. B.</i> Arts Bachelor | <i>Ch.</i> Church |
| <i>Abp.</i> Archbishop | <i>Chanc.</i> Chancellor |
| <i>Acct.</i> Account | <i>Chron.</i> Chronicles |
| <i>A. D.</i> Anno Domini, Year of our Lord | <i>Capt.</i> Captain |
| <i>A. M.</i> Anno Mundi, Year of the world | <i>Clem.</i> Clement |
| <i>Adms.</i> Administrators | <i>Col.</i> Colossians |
| <i>A. M.</i> Artium Magister, Master of Arts | <i>Cl.</i> Clericus |
| <i>Ana.</i> of each a like quantity | <i>Co.</i> Country |
| <i>Ap.</i> April, or Apostle | <i>Coll.</i> Colonel |
| <i>Adm.</i> Admiral. | <i>Comrs.</i> Commissioners. |
| <i>Agt.</i> Against. | <i>Con.</i> Constance, or Constant |
| <i>Amr.</i> Amount | <i>Conf.</i> Confessor [time |
| <i>Anab.</i> Anabaptist | <i>Cor.</i> Corinthians, or Coro- |
| <i>Aug.</i> August | <i>Cr.</i> Creditor [lary |
| <i>A. R.</i> Anno Regni, in the year of the reign | <i>C. R.</i> Carolus Rex, or Charles the King |
| <i>Asst. P. G.</i> Astronomy-Professor at Gresham College | <i>C. C. C.</i> Corpus Christi College |
| <i>Aust.</i> Austin, or Austria | <i>C. S.</i> Custos Sigilli, Keeper of the Seal |
| <i>B. A.</i> Bachelor of Arts | <i>C.P.S.</i> Custos privati Sigilli, Keeper of the Privy Seal |
| <i>B. D.</i> Bachelor of Divinity | <i>D.</i> Dean, or Duke |
| <i>B. V.</i> Blessed Virgin | <i>Dan.</i> Daniel |
| <i>Bart.</i> Baronet | <i>Dr.</i> Doctor, or Debtor |
| <i>Bp.</i> Bishop | <i>Dea.</i> Deacon |
| <i>Cant.</i> Canticles, or Canterbury | <i>Do.</i> Ditto, or the same |
| <i>Cat.</i> Catechism | <i>D.</i> Denarii, Pence |
| <i>Cha.</i> Charles | <i>Dec.</i> or xber, or iober, December |
| <i>Chap.</i> Chapter | <i>Devon.</i> Devonshire |
| | <i>Deut.</i> Deuteronomy |
| | <i>Dec.</i> Deceased |
| | <i>D.C.</i> Dean of Christ-church |
| | <i>D</i> <i>Des.</i> |

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|------------------------------------|------------------------------------|
| <i>Doct.</i> Doctrine | <i>Ibid.</i> Ibidem, in the same |
| <i>D. D.</i> Doctor of Divinity | <i>Id.</i> Idem, the same [place |
| <i>E.</i> for Earl | <i>Inst.</i> Instance, or Instant |
| <i>Earld.</i> Earldom | <i>Ja.</i> James, or Jacob |
| <i>Edm.</i> Edmond | <i>Jan.</i> January |
| <i>Edw.</i> Edward | <i>Jer.</i> Jeremiah |
| <i>Ex. gr.</i> Exempli gratia, for | <i>Jes.</i> Jesus |
| Example | <i>Jno.</i> John |
| <i>Engl.</i> England | <i>Jud.</i> Judges |
| <i>Elif.</i> Elisabeth | <i>If.</i> Isaac |
| <i>Esa.</i> Eſaiah | <i>J. D.</i> Jurium Doctor, Doe- |
| <i>Eph.</i> Ephesians | <i>Jof.</i> Joshua [tor of laws |
| <i>Eccl.</i> Ecclesiastes | <i>K.</i> King |
| <i>Ex.</i> Exodus, or Example | <i>Km.</i> Kingdom |
| <i>Ev.</i> Evangelist | <i>Knt.</i> Knight |
| <i>Exp.</i> Explanation | <i>L.</i> Lord |
| <i>Expo.</i> Exposition | <i>L.</i> Liber, a Book |
| <i>Esq;</i> Esquire | <i>L.</i> Libræ, Pounds |
| <i>Exon.</i> Exeter | <i>Lieut.</i> Lieutenant |
| <i>Fr.</i> French, or France | <i>Lp.</i> Lordship |
| <i>Feb.</i> February | <i>Lyp.</i> Ladyship |
| <i>Fra.</i> Francis | <i>L. L. D.</i> Legum Doctor, |
| <i>F. R. S.</i> Fellow of the Roy- | Doctor of Laws |
| al Society | <i>Learng.</i> Learning |
| <i>Gal.</i> Galatians | <i>Lond.</i> London |
| <i>Gen.</i> Genesis | <i>Lr.</i> Letter |
| <i>Genmo.</i> Generalissimo | <i>Lam.</i> Lamentations |
| <i>Geo.</i> George | <i>Lev.</i> Leviticus |
| <i>G. R.</i> Georgius Rex, George | <i>L. C. J.</i> Lord Chief Justice |
| the King | <i>M.</i> Marquiss, or Monday, |
| <i>Gar.</i> Garrison | or Morning |
| <i>Gen.</i> General | <i>Mar.</i> March |
| <i>Gent.</i> Gentleman | <i>Mat.</i> Matthew |
| <i>Gosp.</i> Gospel | <i>m.</i> Manipulus, a handful |
| <i>Greg.</i> Gregory | <i>M. A.</i> Master of Arts |
| <i>Hen.</i> Henry | <i>Maty.</i> Majesty |
| <i>Hamp.</i> Hamper | <i>Md.</i> Madam |
| <i>Hund.</i> Hundred | <i>Monf.</i> Monsieur |
| <i>Hum.</i> Humphry | <i>Math.</i> Mathematician |
| <i>Heb.</i> Hebrews | <i>Mr.</i> Master |
| <i>i. e.</i> id est, that is | <i>Mrs.</i> Mistress |
| <i>I. H. S.</i> Jesus Hominum Sal- | <i>M. D.</i> Medicinæ Doctor, |
| vator, Jesus Saviour of men | Doctor of Physic |

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|--------------------------------------|--|
| <i>M. S. Memoriae Sacram,</i> | Divinity at Gresham |
| Sacred to the Memory | College |
| <i>M. S. Manuscript</i> | <i>Prif.</i> Priscilla |
| <i>M. S. S. Manuscripts</i> | <i>Pr.</i> Priest, or Prince |
| <i>Mich.</i> Michael, or Michael- | <i>Pf.</i> Psalm |
| mas | <i>P. S.</i> Postscript |
| <i>Min.</i> Minister | <i>Penult.</i> last save one |
| <i>N.</i> Note | <i>Q.</i> Queen, Query, or Que- |
| <i>Nat.</i> Nathaniel, or Nativity | stion |
| <i>N. B. Nota bene,</i> Note, or | <i>q.</i> quasi, as it were |
| mark well | <i>q. d.</i> quasi dicat, as if he |
| <i>Nic.</i> Nicholas, or Nicodemus | should say |
| <i>N. S.</i> New Style | <i>q. l.</i> quantum libet, as |
| <i>No.</i> Number | much as you please |
| <i>n. l.</i> Non liquet, it appears | <i>q. f.</i> quantum sufficet, a |
| not | sufficient quantity |
| <i>Nov.</i> or <i>9ber,</i> November | <i>qr.</i> Quarter, or a Farthing |
| <i>O.</i> Oliver | <i>R.</i> Reason |
| <i>Object.</i> Objection | <i>R.</i> Rex, King; or Regina, |
| <i>Ost.</i> Obedient | Queen |
| <i>O. W.</i> Old word | <i>Revd.</i> Reverend |
| <i>O. S.</i> Old Style | <i>Rev.</i> Revelation |
| <i>Oct.</i> or <i>8ber,</i> October | <i>Rich.</i> Richard |
| <i>Oxon.</i> Oxford | <i>Robt.</i> Robert |
| <i>P.</i> Paul, Paulus, Publius, | <i>Rog.</i> Roger |
| or President | <i>Ret.</i> Return |
| <i>Pugil,</i> a handful | <i>Reg. Prof.</i> Regius Professor |
| <i>Pen.</i> Penelope | <i>Rom.</i> Romans |
| <i>pd.</i> paid | <i>Rt. Honble.</i> Right Honour- |
| <i>Par.</i> Parish | able |
| <i>Pr.</i> per, or by | <i>Rt. Worpl.</i> Right Worshipful |
| <i>Pat.</i> Patience, or Patrick | <i>St.</i> Saint |
| <i>Per. C.</i> per Centum, by | <i>Sam.</i> Samuel |
| the Hundred | <i>Sect.</i> Section |
| <i>Parl.</i> Parliament | <i>Sept.</i> or <i>7ber,</i> September |
| <i>Pet.</i> Peter | <i>Serj.</i> Sergeant |
| <i>Phil.</i> Philippians, or Philip | <i>Serv.</i> Servant |
| <i>Philo. Maib.</i> Philo Mathe- | <i>Shr.</i> Shire |
| maticus, a lover of the | <i>Salop.</i> Shropshire. |
| Mathematics | <i>Sol.</i> Solution |
| <i>P. M. G.</i> Professor of Mu- | <i>Staff.</i> Stafford |
| sic at Gresham College | <i>Sp.</i> Spain, or Spanish |
| <i>Prof. Th. G.</i> Professor of | <i>Sr.</i> Sir |

| | |
|--|---|
| <i>ſs.</i> Semissis, half a pound | <i>W^a</i> William |
| <i>S. S. T. P.</i> Professor, or a | <i>W^p</i> Worship |
| Doctor of Divinity | <i>W^{pl}</i> Worshipful |
| <i>Stew.</i> Steward | <i>W. R.</i> William Rex |
| <i>Tho.</i> Thomas | <i>wn.</i> when |
| <i>Th. ſs.</i> Theſſalonians | <i>Xⁿ.</i> Christian |
| <i>The.</i> Theophilus | <i>X^t.</i> Christ |
| <i>To.</i> Tobias | <i>Xtopher.</i> Christopher |
| <i>V.</i> Virgin, or Verſe | <i>y^e</i> the |
| <i>U.</i> Use | <i>yⁿ</i> then |
| <i>Ult.</i> } | <i>y^m</i> them |
| <i>Ultimus</i> } the laſt | <i>y^t</i> that |
| <i>Vid.</i> See | <i>y^r</i> your |
| <i>Ven.</i> Venerable | <i>&</i> et, and |
| <i>Viz.</i> Videlicet, to wit, or | <i>&c.</i> et cetera, and the reſt, |
| that is to ſay | or, and ſo forth |
| <i>V. gr.</i> Verbi gratia, for Ex- ample | |

And now having finiſhed my directions concerning ſpelling, pointing, &c.; I ſhall proceed to give ſome inſtructions in relation to the moſt uſeful art of writing.

When any perſon has thoroughly acquainted himſelf with ſpelling, and underſtands good Engliſh, &c. the next ſtep neceſſary is the acquiring of the accompliſhing art of fair writing, to put this ſpelling in practice: in order thereto, I ſhall endeavour to give ſuch directions, and proper inſtructions, as may duly qualify any perſon therein.

Fiſt, and principally, there muſt be a fixed deſire and inclination imprinted in the mind for its attainment: for I myſelf had never acquired, or arrived to any proficiency in it, if I had not had a ſtrong deſire and inclination to it; ariſing from being convinced of its excellent uſe in trade, and all manner of buſineſs, according to the verſe,

*Great was his genius, moſt ſublime his thought,
That fiſt fair writing to perfection brought, &c.*

Next to the deſire, there muſt be added a ſteady reſolution to go through with it till it is gained; and, by a diligent and indefatigable application, overcome all ſeeming difficulties, that may ariſe in the progreſs

progress of its attainment, agreeable to this distich :

*By frequent use, experience gains its growth ;
But knowledge flies from laziness and sloth.*

DIRECTIONS TO BEGINNERS IN WRITING.

First, it is necessary to be provided with the following implements, viz. good pens, good and free ink, and also good paper, when arrived to commendable performances; likewise a flat ruler for sureness, and a round one for dispatch; with a leaden plummet or pencil to rule lines: also gum-sandruck powder, (or pounce as they call it), with a little cotton dipped therein, which rub gently over the paper, to make it bear ink the better; particularly when full hands are to be written, such as text, &c. and especially when you are obliged to scratch out a word or letter; for then there will be a necessity for its use: and rubbing the place with the pounce, smoothe it with the hilt of the penknife, or clean paper; and then you may write what is proper in the same place. These implements are summed up in these lines;

*A penknife (razor-metal) quills good store ;
Gum-sandruck powder, to pounce paper o'er ;
Ink shining black ; paper more white than snow,
Round and flat rulers on yourself bestow :
With willing mind, these, and industrious hands,
Will make this art your servant at command!*

To hold the PEN.

THE pen must be held somewhat sloping, with the thumb and the two fingers next to it; the ball of the middle finger must be placed straight, just against the upper part of the cut or cradle, to keep the pen steady; the fore finger lying straight on the middle finger; and the thumb must be fixed a little higher than the end of the fore finger, bending in the joint; and the pen be so placed as to be held easily without griping. The elbow must be drawn towards the body, but not too close. You must support your hand by leaning on the table-edge, resting on it half way between your wrist and elbow, not suffering the ball, or fleshy part of your hand, to touch the paper; but resting your hand on the end of your little finger,

that and your fourth finger bending inwards, and supported on the table as above said. So fixed, and sitting pretty upright, not leaning your breast against the table; proceed to the making the small *o*, the *a*, *c*, *e*, *i*, *m*, *r*, *s*, *w*, and *x*; which must be all made of equal bigness and height; the distance or width between the two strokes of the *n*, must be the same with the distance or width of the three strokes of the *m*; the same proportion of width must be observed in the *u*, *w*, and *o*. The letters with stems or heads, must be of equal height; as the *b*, *d*, *f*, *h*, *k*, *l*, and *j*. And those with tails must be of equal depth, as the *s*, *g*, *p*, *q*, and *f*. The capitals must bear the same proportion one to another, with respect to bigness and height, as *A*, *B*, *C*, *D*, *E*, *F*, *G*, *H*, *I*, &c.—This proportion of letters, both of small and great, must be observed in, and will serve for, all hands whatsoever. *N. B.* That all upright strokes, and those leaning to the left hand, must be fine or hair strokes: and all downright strokes must be fuller or blacker. And when you are in joining, where letters will naturally join, without any straining, take not off the pen in writing, especially in running or mixed hands. Care likewise must be duly taken, that there be an equal distance between letter and letter, and also between word and word: the distance between word and word may be the space that the small *m* takes up; but between letter and letter not quite so much. Sit not long at writing, (that is, no longer than you improve), especially at the first, lest it weary you, and you grow tired of learning. Imitate the best examples, and have a constant eye at your copy; and be not ambitious of writing fast, before you can write well; expedition will naturally follow, after you have gained a habit of writing fair and free; and it is much more commendable to be an hour in writing six lines well, than to be able to write sixty lines in the same time, which perhaps will be altogether unintelligible. And besides, by a slow and fair procedure, you will learn in half the time; and therefore it is a vain thought in a learner, to desire to be quick before he hath acquired experience, and a freedom of writing, by frequent practice. If you have cotton in your ink, look well that there be no hairs at the nib of your pen. Never overcharge

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An easy Copy for Round Hand

A B C D E F G H I K L M N
O P Q R S T U V W X Y Z

a b c d e f g h i k l m n o p q r s
t u v w x y z &c 1 2 3 4 5 6 7 8 9 10

Take great Care and you'll Write fair

Flourishing Alphabet

A B C D E F G H

I K L M N O P Q

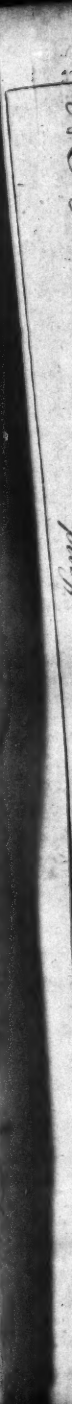
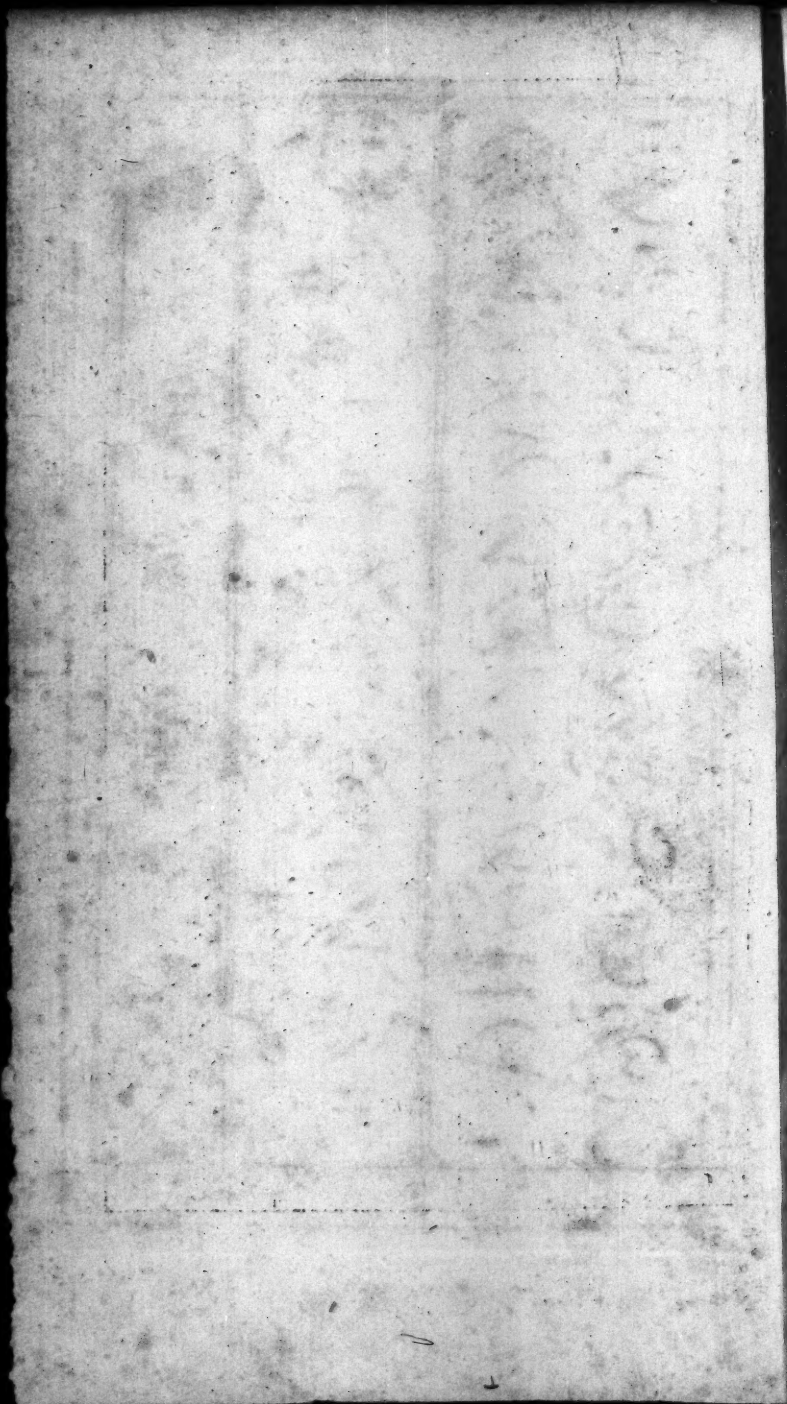
R S T U V W X Y Z

The Italian Hand

A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z

a b c d e f g h i k l m n o p q
r s t u v w x y z &c.

Art is gained by great Labour & Industry



Secretary Hand

A B C D E F G H I K L M N
O P Q R S T U V W X Y Z

A a B b C c D d E e F f G g H h I i J j K k L l
M m N n O o P p Q q R r S s T t U u V v W w X x Y y Z z

Fear God and Honour the King


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overcharge your pen with ink ; but shake what is too much into the ink again.

How to make a PEN.

THis is gained sooner by experience and observation from others that can make a pen well, than by verbal directions. But, *note*, That those quills called seconds are the best, as being hard, long and round in the barrel ; and before you begin to cut the quill, scrape off the superfluous scurf with the back of your penknife ; scrape most on the back of the quill, that the slit may be the finer, and without gander's teeth, (as the roughness in the slit is by some called). After you have scraped the quill as above said, cut the quill at the end, half through, on the back part ; and then turning up the belly, cut the other half or part quite through, *viz.* about a quarter, or almost half an inch, at the end of the quill, which will then appear forked : then enter the penknife a little in the back notch, and then putting the peg of the penknife haft (or the end of another quill) into the back notch, holding your thumb pretty hard on the back of the quill, (as high as you intend the slit to be), with a sudden or quick twitch force up the slit ; it must be sudden and smart, that the slit may be clearer : then, by several cuts on each side, bring the quill into equal shape or form on both sides ; and having brought it to a fine point, place the inside of the nib on the nail of your thumb, and enter the knife at the extremity of the nib, and cut it through a little sloping : then, with an almost downright cut of the knife, cut off the nib ; and then by other proper cuts, finish the pen, bringing it into an handsome shape, and proper form ; but meddle not with the nib again, by giving it any trimming or fine cuts ; for that causes a roughness, and spoils it ; but if you do, to bring the nib the evenner, you must nib it again as above directed.

 *Note*, that the breadth of the nib must be proportioned to the breadth of the body, or downright backstrokes of the letters, in whatsoever hand you write, whether small or text. *Note also*, That in your sitting to write, you place yourself directly against a fore-right light, or else to have it on your left hand, (which I esteem best), but by no means to have the light on your

your right hand, because the shadow of your writing hand will obstruct your sight.

Thus far for direction. Now for application. I have here set copies of the most usual, fashionable, and commendable hands for business; with alphabets of great and small letters, proper to each. Be sure you make your letters well, (both small and great), before you proceed to joining. Be careful in imitation, and observe the foregoing directions, and without doubt you will gain your end. Command of hand, or the art of striking letters, &c. is gained by frequent practising after good examples.

A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z Æ

a b c d e f g h i j k l m n o p q r s t
u v w x y z &

Note, It is necessary for all those who would qualify themselves for business, often to imitate this print-hand; to make clean marks on bales, or plain directions on parcels.

Copies in Alphabetical order.

A

ART is gained by great labour and industry.
A covetous man is always, as he fancies, in want.
Add to your faith virtue, and to virtue knowledge.
A blind man's wife, they say, needs no painting.
A comely countenance is a silent commendation.
A place of ill example may endanger a good man.
A prudent man values content more than riches.
A virtuous man is rather to be chosen than promotion.
A fair piece of writing is a speaking picture.
All worldly things run a continual round.
Authority is the main point in government.
All God's commandments are divinely pure.
A man's manners commonly form his fortune.
A great liar is seldom believed, though he speaks truth.
All evil things and vain, strive ever to refrain.
A virtuous-minded youth will ever love the truth.
A prudent youth and wise, will not advice despise.
All you that would write well, strive others to excel.
Abundance ruins some, but want makes all to moan.
Amendment still should shine, in all and every line.
A greater loss can't be, than that of liberty.
A good and virtuous lad, will shun whate'er is bad.
Affectation renders the fairest face disagreeable.
All idleness avoid, by it most are destroy'd.
All idle lazy boys obstruct their parents joys.
A man by conduct may keep misery away.
All mishap hath been occasioned by our sin.
Avoid th'occasion still, of running into ill.
A youth that would transcend, must ever mind to mend.
A lad that would excel, must mind his copy well.

B

Bounty is commendable in some, but it ruins others.
By a commendable deportment we gain reputation.
By delight, and some care, we come to write fair.
By diligence and industry we come to preferment.
Beauty without virtue is but a painted sepulchre.
Beauty commands some, but money all men.
By constant amendment, we rise to preferment.
Brave men will do nothing unbecoming themselves.
Be wise and beware; of blotting take care.
Bounty is more commended than imitated.

By

By iniquity and sin, misfortunes enter in.
 By idleness and play youth squander time away.
 Barren are those joys we waste away in toys.
 Blessed are their joys above, who do their time improve.
 Badness brings all sadness, therefore follow goodness.
 By trusting to to-morrow men plunge themselves in
 sorrow.
 Be wise betimes ; shun darling crimes.

C

Contentment is preferable to riches and honour.
 Can they be counted wise, who counsel do despise ?
 Care mixed with delight, will bring us soon to write.
 Consider the shortness of life, and certainty of death.
 Contentment is a gem beyond a diadem.
 Competency with content is a great happiness.
 Contention and strife make uneasy our life.
 Courtiers receive presents in a morning, and forget 'em
 by night.

Caution and care oft baffle a snare.
 Contentment makes a man happy without a fortune.
 Censure no man, nor detract from any man.

D

Deride not infirmities, nor triumph over injuries.
 Delight and some care, will make you write fair.
 Delight in virtue's ways, and then you'll merit praise.
 Death conquers potent princes, and their powers.
 Delight in what you undertake to learn.
 Duty, fear, and love, we owe to God above.
 Death is before the old man's face, and may be at the
 young one's back.
 Death only can declare, what dust the bodies of all
 mortals are.

Drinking is the drowning of cares, not the cure of them.
 Death destroys not the soul, but an ill life does.
 Do to others as you would that they unto you should.
 Delay is the remora to all good success.
 Deprive no person of his lawful due, lest they should
 do the same by you.
 Delight and pleasure's but a golden dream.
 Death is less feared by a fool than a philosopher.

E

Endless joys have those, whose sins are vanquish'd foes.
 Every plant and flower shews to us God's power.

Example

Example oft doth rule the wise man and the fool.
Examples oft prevail, when arguments do fail.
Every idle thought to judgment must be brought.
Every sluggard is the cause of his own misfortune.
Envious men do fret, when they see others get.
Evil company make the good bad, and the bad worse.
Experience is the best looking-glass of wisdom.
Even at head and feet, be sure your letters keep.
Endeavour to do well, and then you may excel.
Every man is right, that mixes profit with delight.
Evil men and fly, take care how you come nigh.
Envy and care make the body grow spare.
Every money'd man hath others at command.

F

Fair words are often used to hide foul deeds.
Fair faces have sometimes foul conditions.
Few do good with what they have gotten ill.
Future events must be left to providence.
Fools are ruled by their humour, but wise men by interest.

Firm keep your mind on things that are sublime.
Fear is a good watchman, but a bad defender.
Fate will still have a kind chance for the brave.
Fraud in childhood will become knavery in manhood.
Fear without hope turns to despair.
Faith and hope are both dead when divided.
Fortune is kind at some hours to all.
Feign'd looks oft hide what the false heart doth know.
Fortune and fame create a great name.
Friends in adversity are not often found.
Fools and knaves are not companions for honest men.
Frugality and industry are the hands of fortune.

G

Godliness with contentment is great gain.
Good manners in a lad, will make his parents glad.
Great minds and small means ruin many men.
Good manners, grace, and truth, are ornaments in youth.
Good men as well as bad have sometimes fortunes sad.
Great good you sure will find, if you are well inclin'd.
Good humour hath never failing graces.
God's works only are perfect in their kind.
Gluttony would ransack Noah's ark for the riot of a meal.
Grief nourished in your breast, will never let you rest.

Greater

Greater profit doth always come of learning than of play
 Great men, though they should, are not always good
 Good men are safe when wicked ones are at odds.
 Get what you get honestly, and use it frugally.
 God is omnipresent, true, and almighty.

H

Hasty resolutions are seldom fortunate.
 Haste makes waste of paper, ink, and time.
 He that stumbles, and falls not, mends his pace.
 Honour and renown, will the ingenious crown.
 Hypocrites first cheat the world, and at last themselves
 Human life will human frailties have.
 Honour that is true, 'tis lawful to pursue.
 He that sends a fool of an errand, ought to follow him.
 Honours are burdens, and riches have wings.
 He is a wise security who secures himself.
 He that sins against conscience, sins with a witness.
 Honour the hoary head, that virtue's paths doth tread.
 Happy are their joys who turn away from toys.
 Hours fly swift away, improve each moment in the day.
 He that swims in sin, must sink in sorrow.
 He that fears not an oath, will not tremble at a lie.
 He hath his work half done, that hath it well begun.

I

Instruction, and a good education, are a durable portion.
 Ignorance is the greatest enemy to learning.
 In praising sparing be, and blame most sparingly.
 Imaginary toys do please some idle boys.
 Intemperance is attended by diseases, and idleness by
 want.

It is good to have a friend, but bad to need him.
 Idleness and sloth interrupt learning's growth.
 Innocency need not fear the lion, nor the rugged bear.
 It is better to be unborn, than untaught.
 It is too late to spare, when the bottom is bare.
 Idleness hath no advocate, but many friends.
 Improvement of parts is by improvement of time.
 If you'd win a pen of gold, first learn well the pen to hold.
 It is the work of an age, to repair the misconduct of
 an hour.

K

Keep a close mouth, if you'd have a wise head.
 Kings, as well as mean men, must die.

Kings

Things may command, and subjects must obey.
Kingdoms and crowns must in the dust be laid.
Knowledge sublime is gained by much time.
Keep at a distance from company that's ill.
Keep good decorum in your words and deeds.
Keep close your intention, for fear of prevention.
Kings may win crowns, but cannot conquer death.
Keep faith with all men, and have a care of a lie.
Keep good company, if you'd keep a good name.
Knowledge if abus'd, is like a gem ill-used.
Kingdoms bring care, and crowns are heavy things to wear.

Keep out evil thoughts by entertaining good ones.
Kind actions neglected, make friendship suspected.
Keep safe good counsel, and entertain not ill advice.
Kindle not passion's fire, it burns with dreadful ire.

L

Learn to live as you would wish to die.
Love and honour will bear no rivals.
Learn to unlearn what you have learn'd amiss.
Learn now in time of youth, to follow grace and truth.
Liberty is grateful to all, but destructive to many.
Lying is the duty of none, but the custom of many.
Learning do but love, and then you will improve.
Liberality without discretion, becomes profuseness.
Let no jest intrude upon good manners.
Learn now in youthful prime, to husband well your time.

Learn how to make as well as use a pen.
Liberality should have no object but the poor.
Lost opportunities are very rarely, if ever, recovered.
Let not the work of to-day be put off till to-morrow.
Laugh not out of measure, nor out of season.

M

Modesty has more charms than beauty.
Monuments of learning are most durable.
Many know good, but do not the good they know.
Make use of time, now whilst you're in your prime.
Money commonly corrupts both church and state.
Many think not of living, till they can live no longer.
Many have repented talking, few of being silent.
Man has much to learn, but a short time to live.
Measure not goodness by good words only.

E

Marriage

Marriage is out of season, if we are either too young
or too old.

Most precious time esteem, which no one can redeem
Many live beggars all their lives, that they may not
die so.

Money makes some men mad, many merry, but few sad
Many are led by the ears, more than by the under-
standing.

Most precious things are still possessed with fear.
Many are made saints on earth that never reach heaven
Malice seldom wants a mark to shoot at.

Misfortune is the touchstone of friendship.

Make no friendship with an angry man.

Many things happen between the cup and the lip.

Mend your manners, and that will mend your fortunes.

Many want help that have not the face to ask it.

Momentary and vain is all earthly gain.

N

Nothing is constant in this uncertain world.

Necessity is commonly the mother of invention.

Next to a good conscience, prefer a good name.

None so high can be, as no mishap to see.

Nothing is so difficult but diligence may overcome.

No task's too hard, when heaven's the reward.

None can lay himself under an obligation to do ill.

Never lament or weep, for loss of what you cannot keep.

Noise and talk without some rule, do indicate the
man a fool.

Nature seldom changes with the climate.

Never study to please others, and thereby ruin yourself.

Nature's eldest law we find, is, that we to ourselves be
kind.

O

Opportunity neglected, brings severe repentance.

On present time depends our future state.

Of all prodigality, that of time is the worst.

Of what gives most delight, we soonest lose the sight.

Omitting to do good, is to commit evil.

Orators are more solicitous to speak well, than to do so.

Our sand doth run apace, and soon we end our race.

Our life here is but a journey to the next world.

Our minds must be cultivated, as well as our plants.

Other people's deaths should be remembrancers of our
own.

Our

Our early care should be, to live most piously.
Our time of life is call'd a span, by which observe how
frail is man.

One vice is more expensive than ten virtues.

P

Provide against the worst, and hope for the best.
Poor men want many things, but covetous men all.
Patience and time run through the roughest day.
Put to your tongue a bridle, that it talk not idle.
Pain, disgrace, and poverty, have frightful looks.
Prayers and provender hinder no man's journey.
Put not off the main business of life, to the very article
of death.

Pain we can count; but pleasure steals away.

Poor freedom is better than rich slavery.

Pursue useful and profitable studies.

Passion and partiality govern in too many cases.

Perfection in this world is virtue, and in the next
knowledge.

Q

Quick promisers are commonly slow performers.

Quietness and content are mates most excellent.

Qualify exorbitant passions with quietness and patience.

Quiet men have quiet minds, and enjoy content.

Quicken learning with alacrity and delight.

Quarrelsome persons often meet with their match.

Quarrels are more easily begun than ended.

Quietness is secure, but rashness is dangerous.

Quietly learn to bear a cross; if we repine, it is our loss.

Questions in jest no serious answers need.

Quench passion's heat; don't suffer it to reign.

Quantity with some is what they'd hit, but quality
prevails with men of wit.

R

Remember your duty to God, your neighbour, and
yourself.

Repentance comes too late when all is consumed.

Reason should always guide, and o'er our acts preside.

Reputation should be the darling of human affections.

Rest continued long, makes idleness grow strong.

Rely on virtue more than blood.

Repent to-day. To morrow may be too late.

Reputation is like a glass, when crack'd it cannot be mended.

Reputation is gained by many actions, and lost by one. Remember death, and do not forget judgment.

Religion in hypocrites is but skin deep.

Relations and friends pursue their own ends.

Religion is best understood when most practised.

Riches serve a wise man, and rule a fool.

Run no great risk for 'vantage small, though some for money hazard all.

Revenge is a pleasure only to a mean spirit.

Righteous men's prayers will be regarded.

Repentance is a quite forsaking sin; but be repentant not that remains therein.

Resolve to amend, and pursue't to your end.

Review the time you have mispent; think upon it, and lament.

Recreation should fit us for business, not rob us of time.

S

Sin and sorrow are inseparable companions.

Self-love is the greatest flatterer in the world.

Some had rather discharge a reckoning, than pay a debt.

Sin is the certain first cause of misfortune.

Study to live quiet, and to do your own business.

Some in their zeal are hot, but knowledge they have not.

Set bounds to zeal by discretion.

Silence is the sanctuary of prudence and discretion.

Sloth is an argument of a mean and degenerate mind.

Short, and therefore vain, is all earthly gain.

Soft words sometimes work upon the proudest heart.

Sleep and idleness are enemies to learning.

Sin is the cause of shame; who love it are to blame.

Small means and large minds ruin many men.

Short are all extremes, whether of good or ill.

Spend time in good duties, and treasure in good works.

Some go fine and brave, finely to play the knave.

Six foot of earth ends all distinctions of our birth.

Some must die, that others may live, said the grave-digger.

Silly people are commonly pleased with silly things.

Some are full of oral sanctity, and mental impiety.

Small profit comes from all ungodly gain.

T

Train up a child in the practice of love and good manners.

The end of mirth is many times the beginning of sorrow.

Time is so swift of foot that none can overtake it.

Time passeth swift away, no mortal can it stay.

Time passeth swift away, improve therefore each day.

The doing nothing, is very near to doing evil.

Those who won't mend to-day, *shall* have more work to-morrow.

The borrower is a slave to the lender ; and the security a slave to both.

Trust is the strongest band of human society.

The endowments of the mind ought not to be confin'd.

Truth may be blamed, but cannot be shamed.

Trust not too far, nor mistrust too soon.

The city cares not what the country thinks.

To do good, is the way to find it.

'Tis just so much lost as is idly spent.

There is no such thing in nature as perfection.

Time, tide, and carriers, *will* for no man stay.

The unfortunate are insulted by every rascal.

'Tis inhuman to sport with another's infirmities.

V

Vanity makes beauty contemptible.

Vain and transitory is all worldly glory.

Virtue and fortune work wonders in the world.

Value more a good conscience than great fame.

Unwillingly go to *law*, and *willingly* make an end.

Understanding a thing is half doing it.

Variety is the happiness of life.

Virtuous and brave actions gain reputation.

Use soft words and hard arguments.

Virtue is commended by *all*, but followed by few.

Unthankfulness is the cause of the earth's unfruitful-

Vain conceitedness is ridiculed by *all*. [ness.

Virtue is seldom a match for power.

Understand things not by their form, but quality.

Virtue all commend, but few do it attend.

Union and peace make discord to cease.

Valour and greatness are preferred before neatness.

Vain and foolish things disreputation bring.

Virtuous actions *will* bring reputation still.

W

What is more vain than public light to shun.
 Wisdom is more valuable than riches.
 What pleases God must be : None alters his decree.
 We are many times deceived with the bare shew of good.
 Women and wine, tho' they smile, they make men pine.
 When fortune knocks, be sure to ope the door.
 Wine is a turn-coat ; first a friend, then an enemy.
 What is violent is seldom permanent.
 When good cheer is lacking, our friends *will* be packing.
 Wise men keep their expences short of their income.
 We keep a better account of our money than our time.
 Wickedness in jest leads us to wickedness in earnest.
 We must not blame fortune for our own faults.
 Where knavery is in credit, honesty is put out of countenance.
 We must look to time past, to improve what's to come.
 What is fixed in our hearts, is seldom out of our heads.
 Wickedness comes on by degrees, as *well* as virtue.
 Would you be rich, be industrious ; if wise, be studious.

X

Xenophon was a great captain, as *well* as a philosopher.
 Xerxes wept at the thoughts that his vast army would be dead in a hundred years.
 Xerxes whipt the sea, because it would not obey his command.
 Xenophon accounted the wise man happy.
 Xenophilus lived without sickness one hundred and seven years.
 'Xamples of the best for ever mind, and imitate in kind.
 Xerxes wept at the changeable state of man.
 'Xamine well how you improve, for that will be as you your learning love.
 'Xercise will much improvement gain.
 'Xperience is the mistress of all arts and sciences.
 'Xcel in what you can, and strive to lead the van.
 'Xpress your desire to learn by your diligence.

Y

Youth is full of disorder, and age of infirmity.
 Young men lament your minutes mispent.
 Your time improve, and squander it not away.
 Your spelling mind, and sense of what you write.
 Yield quietly to what must come unavoidably.

Young

Young men in strength should provide against age
and weakness.

Youth in their prime should manage *well* their time.

Youth to the grave do go, as *well* as the aged do.

Yield yourself servant to righteousness and holiness.

Your copy mind, write fair, and of blotting beware.

Your care should appear by writing most fair.

Your delight and your care will make you write fair.

Z

Zeal in a good cause, will merit applause.

Zeal mixed with love, is harmless as a dove.

Zealously strive, with emulation to write.

Zealously strive for an eternal crown.

Zeno was the first of the Stoic philosophers.

Zeal without knowledge is but religious wild-fire.

Zaccheus he was low, but yet his faith wa'nt so.

Zeal, if not rightly directed, is *very* pernicious.

Zealously bend amain, fair writing to attain.

Short lines for text-hand.

Abandon whatsoever's ill.—Be wise betimes.

Care destroys the body.—Do the things that are just.

Expect to receive as you give.—Frequent good company.

Give what you give cheerfully.—Have good men in
esteem. (ments.

Imitate that which is good.—Keep God's command.

Learn to be wise.—Make a right use of time.

Nothing get, nothing have.—Observe modesty.

Pleasures are very short.—Pains are very long.

Quit all revenge.—Quit your passions.

Recompense a good turn.—Repent of your sins.

Silence gives consent.—Sin very little.

Time is more precious than gold.—Turn from your sins.

Use moderate pleasure.—Use not bad company.

Vain are some pleasures.—Vice is detestable.

Wisdom is the principal thing.—Wise men are scarce.

Xenophon and Xenocrates.—Zenô and Zenobia.

Yesterday cannot be recalled.—You cannot take too
much care.

Double lines in verse.

All you that in fair writing would excel,

How much you write regard not, but how well.

Bear your pen lightly, keep a steady hand,

And that's the way fair writing to command.

Carefully

Carefully mend in each succeeding line,
For that's the way to reach to what is fine.
Descending strokes are dark, but upward small;
Even at head and feet keep letters all.
From blots keep clean your book; and always mind
To have your letters all one way inclin'd.
Grace every letter perfect, full, and small;
And keep a due proportion in them all.
Hold your pen lightly, gripe it not too hard;
And with due care your copy well regard.
Join every letter to its next with care,
And let the stroke be admirably fair.
Keep a light hand, and smoothly glide along.
Ascending fine, and downward strokes are strong.
Let graceful beauty in each line appear,
And see the front do not excel the rear.
Majestic grace, both beautiful and strong,
Doth, or else ought, to every line belong.
No roughness at the edge should e'er be seen;
But all the letters should be smooth and clean.
On care depends the beauty of each line,
For that alone will make your art to shine.
Praise is deserved by the careful hand,
But for th' unthinking, doth correction stand.
Quit yourself nobly with a prudent care,
Of clumsy writing, and of blots beware.
Remember strictly what the art enjoins,
Equal siz'd letters, and as equal lines.
Small letters must of equal height be seen;
The same of great; both beautifully clean.
Time and delight will easy make the task;
Delight, delight's the only thing I ask!
Vain are the hopes of those who think to gain
This noble treasure, without taking pain.
Whilst idle drones supinely dream of fame,
The industrious actually do get the same.
'Xemplar lines are writing surest law;
Precepts may lead us, but examples draw.
Youth is the time for progress in all arts;
Then use your youth to gain the noblest parts.
Zeal for attainment of each art will prove
One means of purchasing the gen'ral love.

Since


Since good ink is necessary to good writing, I shall give a receipt or two for making some of the best black ink in the world, which is as follows, *viz.*

A receipt for black INK.

TO six quarts of rain or river water, (but rain-water is the best), put one pound and a half of fresh blue galls of Aleppo, (for those of Smyrna are not strong enough), bruised pretty small; 8 ounces of copperas, clean, rocky, and green; also 8 ounces of clean, bright, and clear gum Arabic; and 2 ounces of roche alum: let these stand together, in a large stone bottle, or clean stone-pot, or earthen pot, with a narrow mouth to keep it free from dust; shake, roll, or stir it well, once every day, and you will have excellent ink in about a month's time; and the older it grows, the better it will be for use.

Ingredients for a quart.

1 quart of water, 4 ounces of galls, 2 ounces of copperas, and 2 ounces of gum mixed and stirred as above.

 If you soak the green peeling of *walnuts*, (at the time of the year, when pretty ripe), and oak saw dust, or *small* chips of oak, in rain water, and stir it pretty often for a fortnight: the water strained off, and used with the same ingredients as above, will render the ink *still* stronger and better.

How to make red ink.

TAKE 3 pints of stale beer (rather than vinegar) and 4 ounces of ground Brazil wood; simmer them together for an hour; then strain it through a flannel, and bottle it up (well stopped) for use.

Or you may dissolve half an ounce of gum Senega, or Arabic, in half a pint of water; then put a pennyworth of vermilion into a small gallipot, and pour some of the gum-water to it, and stir it well, and mix it together with a hair-pencil, to a proper consistency; but it will not incorporate presently, but by the next day it will; then having a clean pen, dip it into the ink, having first well stirred it with the pencil, and then you may use it: it is a fine and curious red, though not so free as the other. And after the same manner, you may make any other coloured ink, as blue,

blue, green, yellow, purple, &c. having divers gallipots for that use. In like manner, you may mix the *shell-gold*, for curious occasions, pouring two or three drops according to direction, into the *shell*, and mix it well with a clean hair pencil, and with it put a little into a clean pen, &c. The small shells may be bought at some fan-sellers, or fan-painters, at two or three for twopence; or the large ones (which are the best) at the colour shops, at sixpence a-piece.

To keep ink from freezing or moulding.

IN hard frosty weather ink will be apt to freeze; which if once it doth, it will be good for nothing, for it takes away all its blackness and beauty. To prevent which, (if you have not the conveniency of keeping it warm, or from the cold), put a few drops of brandy or other spirits into it, and it will not freeze. And to hinder its moulding, put a little salt therein.

Familiar letters on several occasions, and on divers subjects.

BEFORE we enter upon *Arithmetic*, it may be proper to give some examples of letters on various subjects, and upon divers occasions; which letters frequently read over, and sometimes copied may be a good introduction to a handsome stile, and a commendable manner of writing; besides the help and use they may be of in noting and observing the method of spelling good English, and orthographically placing *great letters*, or capitals, where they ought to be; and also in imprinting in the mind the due notion of points, stops, &c. and when and where to be made.

Letters are variously worded, and ought properly to express the desires, thoughts, &c. of the writer to the reader, that thereby the receiver of the letter may fully understand, and be justly informed of the occasions, wants, or intentions of the sender.

Letters being writ on several subjects, and on sundry occasion, they may be ranked under these denominations, or several heads following, *viz. letters of proffered assistance, of thanks, of excuse, of reproof, of advice or counsel, of recommendation, of remonstrance, of business, and of amusement; letters consolatory, congratulatory, and exhortatory;*

ortatory; also familiar and mixed letters, containing various subjects.

I shall not have room to touch upon every one of these particularly; but I shall give sundry examples promiscuously as follows, viz.

A LETTER from a son to his father.

Honoured Father,

AS I have not had a letter from you, since your favour of the 8th of October last, which I answered by the next post, I take this opportunity of inquiring after your health, and that of my sister. I have herewith sent you, Sir, by Samuel Simple, the Pempsey carrier, a spaniel dog, called Tray; who is an excellent good one of his kind, and fit for the sport of your place; is very free for the water; and if he hath any fault, it is being a little too eager; but he is young, and may be brought to what you please to have him. Pray give my love to my sister, and be pleased to accept of my duty to yourself, who am,
London, Dec. 6.

Sir, Your most dutiful son,

1762.

and humble servant,

ANTHONY ADDLEHILL.

The ANSWER.

Dear Son,

Pempsey, 28th Xber, 1762.

I Received your letter of the 6th instant, and thank you for inquiring after my health, which, I thank God, I perfectly enjoy at present, as I wish and hope you do yours.—I received your present of the dog; but the poor cur was almost starved, having (as I suppose) had nothing on the road; but he is now in good condition, and hath been tried as to his mettle, which I find to be good. I have sent you by the carrier half a dozen of wild ducks, which Tray fetched when I had shot them. Your sister remembers her love to you, and hath sent you a turkey and a chine of bacon, to which I wish you and your friends (if you invite any) a good stomach. My prayers to God for your prosperity, temporal and eternal, are constantly offered up by

Your loving father,

ANDREW ADDLEHILL.

S. We have a great many wildfowl in our level, so that you may expect another present of that kind in a little time.

Note,

Note, *The letters P. S. signify postscript; which name is given to any thing which is (like the four last lines in the preceding page) wrote below the body of a letter.*

A LETTER from a young man to his uncle.

Honoured Uncle,

THE many kind and courteous things that you have done for me, oblige me, in point of gratitude as well as duty, (as an opportunity now offers itself) to make a tender to you of my poor, but real and hearty service, in the affair between you and Mr A. B. of this place: and if you will please but to communicate to me your intentions, and give me your directions therein, I will execute them with all punctuality; and will, from time to time, give you an exact account of my proceedings therein. Therefore in expectation of your commands, I remain,

Norwich, Dec. 7.

1766.

*Sir, Your most obliged nephew,
and very humble servant,*

BRIAN BING.

The Uncle's ANSWER.

Nephew,

London, Dec. 12. 1766.

I Take the offer of your service in the business between me and Mr A. B. of your city very kindly, and think none fitter to adjust that affair than yourself; but I am unwilling to go to law, and had rather, much rather, that you would endeavour to bring him to some reasonable accommodation; for in such contests the winner is commonly a loser in the end. Therefore if you can bring him to any reasonable terms, I shall be very glad: you understand the affair, and so I shall commit it wholly to your discreet and good management, being persuaded that you will do for me as for yourself; in which opinion I remain,

Your loving and affectionate uncle,

BAZIL BING.

A LETTER from a niece to her aunt.

Madam,

THE trouble I have already given you puts me to the blush, when I think of intruding again on your

our goodness ; but necessity, which frequently obliges us to such actions as are contrary to our inclinations, is the motive that induces me to be thus troublesome now. Pray, dear Madam, excuse me, if I once more beg your assistance, which I do not doubt, but you very well know I stand greatly in need of, at this time ; and I shall ever have a grateful remembrance of your goodness to me ; and I hope I shall be, one time or other, in a capacity of making some return for the many obligations your goodness hath conferred upon me.

London, Dec. 7.
1766.

*Your most respectful niece,
and very humble servant,
PENELOPE PINCH.*

A LETTER of profered assistance to a friend.

Dear friend,

It should be false to true friendship, if I should neglect or cast off my friend in adversity. I have heard that you are under some misfortune, and at present need my assistance. I therefore send you these lines for your consolation, desiring you to bear up against your ill-luck with as much patience of mind as you can : for assure yourself, I shall suddenly follow this epistle in person, and come, I hope, opportunely enough to your assistance ; till which time, take courage, and be assured that you shall not be disappointed of timely help, from, dear friend,

Yours in reality,

TIMOTHY TIMELY.

A brother to a sister.

Dear Sister,

MY great distance and long absence from you (though I have not wanted good company) makes me very solicitous concerning your welfare : natural affection inclines me strongly to have you in remembrance, tendering your health and welfare in every respect as dear as my own ; and there is nothing at my command, but, if you request, it shall be freely yours. Notwithstanding the distance, I purpose (God willing) to make you a visit very shortly ; and

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had

had done it before now, but an urgent occasion interposed, the particulars of which being too long for a letter, I shall acquaint you with when I see you. Pray give my due respects to all friends, particularly to honest Mr S. T. And so in expectation of finding you all well at my arrival, I conclude,

Dear sister,

*Your affectionate brother,
and humble servant,*

HENRY HEARTY.

A LETTER from a youth at school to his parents.

Honoured Father and Mother,

I Received your kind letter of the 4th of November last, and also the several things therein mentioned, by the Chichester carrier, for which I return you my most humble and hearty thanks, they coming very seasonably to the relief of my necessities.—I endeavour to make the best improvement in my learning that I possibly can, (though at the first it seemed a little irksome and hard); and I hope to gain the point at last, for which you sent me hither. Pray, dear parents, accept of my most humble duty to yourselves, and kind love to my brothers and sisters, and to my quondam playfellows, particularly to Jacky Jinglebrains, and tell him, I hope by this time he begins to be a little serious.—I am,

*London, Dec. 6.
1766.*

*Honoured parents,
Your dutiful son, and humble servant,
STEPHEN STUDIOUS.*

Another.

Honoured Sir,

I Am very much obliged to you for all your favours; all I have to hope is, that the progress I make in my learning will be no disagreeable return for the same: gratitude, duty, and a view of future advantages, all conspire to make me fully sensible how much I ought to labour for my own improvement, and your satisfaction, in order to shew myself, upon all occasions, to be

*Eton School,
May 3. 1766.*

*Your most obedient son,
DANIEL DILIGENT.*

The Young Man's Best Companion.

B

A LETTER of recommendation.

SIR,

THE bearer hereof, Francis Faithful, I send to you as one whose honesty you may rely on; and my experience of his conduct and fidelity gives me a certain kind of confidence in recommending him to you: for you know me, Sir, and I believe you cannot in the least think, that I would recommend any one to you, of whose probity I had the least shadow of doubt or suspicion. I am, with due respect,

*Sir, Your real friend,
and humble servant,*

GEORGE GENEROUS.

A LETTER of thanks.

SIR,

I Received your favour, with the kind present which accompanied it: I have no other way of expressing my gratitude at present, than by my hearty thanks: every thing you do has a peculiar excellence; and the manner of doing it, is as agreeable as the action itself. But I must stop, lest I should offend that delicacy, which I would commend, and which is constantly admired by,

*Sir, Your most obliged,
and most humble servant,*

GEORGE GRATEFUL.

To a country chapman.

Mr Francis Fairdealer,

London, Dec. 8. 1766.

SIR,

YOU and I have formerly had trading together, and it is not my fault that we do not continue to do; for assure yourself, I have a great value and respect for you, and on that account, none shall be more ready to oblige you in what I may; therefore, pray let us once more reassume our dealings together; and you shall find, that for any goods you have occasion for in my way, none shall use you more kindly than,

SIR,

Your real friend and humble servant,

TITUS TRADEWELL.

*A LETTER of congratulation.**S I R,*

AS I am perfectly sincere in the professions of friendship which I have constantly made to you, you will certainly believe that I am sensibly rejoiced at your late good fortune. As your merit gave me occasion to foresee it, long before it happened, so I was not at all surpris'd on hearing thereof. I heartily wish you greater success, and beg that you will always continue me in the number of those whom you permit to subscribe themselves, as I now do,

London, April 2.

1766.

*Sir, Your most obedient and**most faithful servant,*

RALPH REAL.

*A LETTER of inquiry of health.**S I R,**Hammer Smith, Oct. 9. 1766.*

NOT hearing from you in such a length of time as from the eleventh of June last, I am concern'd, lest sickness, or some other accident, hath happen'd to you, or to some one of your family: my uneasiness occasions my giving you this trouble, and I wish that I may find things with you better than my fear suggest; however, be pleas'd to let me know the certainty with all convenient speed; and therefore you will very much oblige,

*Sir, Your real friend,**and very humble servant,*

PETER PITIFUL.

*A LETTER by way of a petition to a friend.**Honoured Sir,*

I Am uncertain whether my late misfortunes have come to your knowledge; however, I must humbly presume on your good nature, being assur'd, by sundry examples of your compassion, that you will think of and take pity on the distressed: therefore, as an object truly deserving compassion, I most humbly implore and petition you to consider the many losses and disappointments that I have lately met with, which have reduced me to such necessitous circumstances, that I cannot possibly proceed in my affairs. You was pleas'd once to style me your friend, and so I was indeed;

ed; and so I would most certainly be now, and
new it by a single proof of kindness, if our circum-
stances were changed, by standing between you and
misfortune, and screening you from the contempt in-
cident to poverty and distress. I doubt not, Sir, but
your generosity and goodness is as great; and I hope,
with all humility, you will be pleased to interpose
your good offices between ruin and

Sir, Your very humble servant,

LAWRENCE LUCKLESS.

A LETTER of friendship.

Dear Friend,

It is now a long time (as I account it) since you
and I have had any mutual converse by letter,
which to me is a great unhappiness; and really, if
distance did not somewhat excuse, I should be apt to
tax you with unkindness; but however, perhaps you
may not have the same conveniency of writing at
your place, for want of postage, as we have at ours;
and on that account, I shall not insist on it as an in-
fringement of friendship, the chief purport of this
being to inquire of your welfare, and to have an an-
swer given to,

S I R,

Your real friend,

and very humble servant,

KENDRICK KINDLY.

A LETTER of business.

S I R,

Yours of the 25th ult. is now before me; in answer
to which, I positively declare, That Mr A. B.
hath not been with me, to present the bill of ex-
change that you mention in your letter of advice to
me, and therefore there can be no just cause of pro-
test, or any other charge put on

S I R,

London, May 1.

1766.

Your humble servant,

JOHN INNOCENT.

It is as proper to know how to subscribe, and how
to direct, as it is to write a letter.

SUPERSCRPTIONS.

To the King's Most Excellent Majesty.
To the Queen's Most Excellent Majesty, &c.

To the Prince, *To his Royal Highness, &c.*

To the Princess, *To her Royal Highness, &c.*

To Archbishops.

To his Grace the Lord Archbishop of Canterbury; or,

To the Most Reverend Father in God, &c.

To Bishops.

To the Right Reverend Father in God, &c.

To Deans, Archdeacons, &c.

To the Reverend A. B. D. D. Dean of W.

To the inferior Clergy.

To the Reverend Mr A. &c. or, To the Rev. Doctor, &c.

To the great officers of state.

To the Right Honourable P. Earl of H. Lord High Chancellor of Great Britain.—Lord President of the Council.—Lord Privy Seal.—One of his Majesty's Principal Secretaries of state, &c.

To Temporal Lords.

To his Grace the Duke of, &c. To the Most Honourable the Marquis of, &c. To the Right Honourable the Earl of, &c. To the Right Honourable the Lord Viscount, &c. To the Right Honourable the Lord, &c.

The eldest sons of dukes, marquises, and earls enjoy, by the courtesy of England, the second title belonging to their father. Thus the eldest son of the Duke of Bedford, is called Marquis of *Tavistock*; of the Duke of Grafton, Earl of *Euston*; of the Earl of Macclesfield, Lord Viscount *Parker*, &c.; and their daughters are all called Ladies, with the addition of their Christian and surnames, thus, Lady *Caroline Russel*, Lady *Augusta Fritzroy*, Lady *Betty Parker*, &c.

The younger sons of dukes are in like manner called Lords; and those of marquises and earls, together with all the children of viscounts and barons, are styled *Honourable*.

To a Baronet, *Honourable*; to a Knight, *Right Worshipful*; and to an Esquire, *Worshipful*.—Every privy counsellor, though not a nobleman, hath the title of *Right Honourable*. All Ambassadors have the style of *Excellency*; as hath also the Lord Lieutenant of Ireland, and the Captain General of his Majesty's forces. The Lord Mayor of London, during his mayoralty, hath the title of *Right Honourable*. And the sheriffs, during that office, have the title of *Right Worshipful*. All mayors of corporations have the title of *Esquires*, during their office.

For the beginning of letters.

To the King ; Sir, or, *May it please your Majesty.*
 To the Queen ; Madam, or, *May it please your Majesty.*
 To the Prince ; Sir, or, *May it please your Royal Highness.*
 To the Princess ; Madam, or, *May it please your Royal Highness.*

To a duke ; My Lord Duke, or, *May it please your Grace.*
 To a duchess ; Madam, or, *May it please your Grace.*
 To an archbishop ; *May it please your Grace.*

To a marquis ; My Lord, or, *May it please your Lordship.*
 To a marchioness ; Madam, or, *May it please your Ladyship.*
 To an earl, viscount, or baron ; My Lord, or, *May it please your Lordship.*

To their consorts ; Madam, or *May it please your Ladyship.*
 To a bishop ; My Lord, or, *May it please your Lordship.*
 To a knight ; Sir, or, *May it please your Worship.*

To his lady ; Madam, or, *May it please your Ladyship.*
 To a mayor, justice of peace, esquire, &c. ; Sir, or, *May it please your Worship.*

To the clergy ; Reverend Sir, Mr Dean, Mr Archdeacon, Sir, &c. as circumstances may require.

At subscribing your name, conclude with the same title you began with ; as, My Lord, your Lordship's, &c.

To either house of parliament, and to commissioners, or bodies corporate ;

To the Right Honourable the Lords Spiritual and Temporal in parliament assembled.

To the Honourable the Knights, Citizens, and Burgeses in parliament assembled.

To the Right Honourable the Lords Commissioners of the Treasury, or Admiralty.

To the Honourable the Commissioners of his Majesty's Customs ;—Revenue of the excise, &c.

To the Right Worshipful the Governors of Christ's Hospital, London.

To the Master, Wardens, and Court of Assistants of the Worshipful Company of Drapers.

Of secret writing.

Here it may not be improper to say something of secret writing ; to which Bishop Wilkins, in his book of Mathematical Magic, speaks largely ; but it is principally concerning writing in cipher, which requires great pains, and an uncommon share of ingenuity, both in writers and readers. But however,

I shall shew two or three particular ways that are very pretty and amusing, and also very easy, both as to cost and pains. And,

First, If you dip your pen in the juice of a lemon, or of an onion, or in your own urine, or in spirits of vitriol, and write on clean paper whatever you intend, it *shall* not be discerned till you hold it to the fire, and then it will appear legible. And if with any of the aforementioned you write on your skin, as on your arm, and back of your hand, &c. it shall not be seen till you burn a piece of paper, and with the ashes rub on the place, and then it will appear very plain: and this I have experienced and tried, and therefore can say, *Probatum est*.

Another way is, when you write a letter that you intend it shall not be discovered, but to those you think fit, first to write your thoughts on one side of your letter with black ink, as usual, (but it ought to be on thin paper), and then on the contrary side, go over the said matter that you would have secret, with a clean pen dipped in milk, and that writing shall not be read without holding it to the fire, as mentioned above, and then it will appear *legible*, in a bluish colour.

A third method is, to have two pieces of paper of equal size, and the uppermost cut in chequered holes or squares, big enough to contain any word of six or seven syllables, and in those squares write your mind in regular sense; and then take off the said chequered paper, and fill up the vacancies with words of any kind, which will render it perfect nonsense, and not capable of being read to any purpose of intelligence: and transmit and send the said uppermost, or chequered paper, or another exactly of the same form, to your correspondent; whereby he shall, by laying it nicely on your said letter, read your intended sense, without being perplexed with the words of amusement intermixed, which make it altogether intelligible.

Or again, you may write to your friend in proper sense with common ink, and let the lines be at so commodious a distance, that what you intended to be secret may be written between them, with water wherein galls have been steeped a little time (but not long

long enough to tincture the water); and when dry, nothing of the writing between the said lines can be seen; but when it is to be read, you must, with a fine hair pencil, dipped in copperas-water, go between the said lines, and so you make it legible.

Note, This way will give no ground for suspicion, because the letter seemeth to carry proper sense in those lines that are set at such a proper distance, &c.

Of ARITHMETIC.

AFTER writing, the next necessary step towards qualifying a person for business, is the understanding that truly laudable and most excellent accomplishment, the noble science of *Arithmetic*; a knowledge so necessary in all the parts of life and business, that scarce any thing is done without it.

In my directions for its attainment, I shall proceed with such plainness of method, and familiarity of style, as shall render it easy to be understood, and conspicuous to the meanest capacity.

And first of *Notation* and *Numeration*.

In *Notation*, we must note or observe, that all numbers are expressed by, or composed of these ten figures or characters following, viz.

One, two, three, four, five, six, seven, eight, nine, cipher.

1 2 3 4 5 6 7 8 9 0

Nine of these are called significant figures, to distinguish them from the *cipher*, which of itself signifies nothing; but as it is placed (in whole numbers), serves to increase the value of the next figure or figures that stand before it; as 3 is but three; but before the *cipher* thus, 30, the three becomes thirty, &c.

But in decimal fractions, (0) decreases the value of the figure behind it, for therein 3 is three tenths of any thing; but by placing 0 before it thus, 03, it is decreased from 3 tenth parts to three hundred parts of any thing, &c.—We are to note, That every one, or any of the above-mentioned nine figures, or digits, have two values; one certain, and another uncertain; the certain value is, when it stands alone by itself; the uncertain is, when joined or placed with other figures or ciphers, for when any one of these figures stands alone, they signify no more than their own simple

simple value; as 5 is but five, 4 but four, 6 but six, and 3 no more than three, &c. And this is the certain value of a figure: but when another figure or cipher is annexed, they then are increased in the value ten times; as 5, or 5 units, or ones, to 5 tens or fifty; 4 to 4 tens or forty; 6 to 6 tens or sixty; and 3 to 3 tens or thirty; as thus, 51, fifty-one; 42, forty-two; 63, sixty-three; 34, thirty-four, &c. Again, if any of the said figures stand in the third place towards the left hand, they signify so many hundreds as they express units or ones; as 500 is five hundreds, 400 four hundreds, 600 six hundreds, and 300 three hundred &c. If any of them possess the 4th place towards the left hand, they are so many thousands, as they contain units; and so any, or every figure increases by ten fold proportion, from the right hand to the left, according to the place it is found or stands in; so the 5 may be either five or fifty; five hundred, or five thousand: in the first place 5; in the second 50; in the third 500; in the fourth place 5000, &c. The true value of figures in conjunction, may be fully learned and understood by the following table.

The NUMERATION-TABLE.

| C. thous. of m. | X thous. of m. | Thous. of mil. | C. of millions. | Tens of mill. | Millions | C. of thous. | Ten of thous. | Thousands | Hundreds | Tens | Units | Thous. of mil. | Millions | Thousands | Units or ones |
|-----------------|----------------|----------------|-----------------|---------------|----------|--------------|---------------|-----------|----------|------|-------|----------------|----------|-----------|---------------|
| 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 12 | 1 | 1 | 1 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 123 | 456 | 789 | 012 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 12 | 345 | 678 | 901 |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 234 | 567 | 890 |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | 123 | 456 | 789 |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 12 | 345 | 678 |
| | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | 1 | 234 | 567 |
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | | | 123 | 456 |
| | | | | | | | 1 | 2 | 3 | 4 | 5 | | | 12 | 345 |
| | | | | | | | | 1 | 2 | 3 | 4 | | | 1 | 234 |
| | | | | | | | | | 1 | 2 | 3 | | | | 123 |
| | | | | | | | | | | 1 | 2 | | | | 12 |
| | | | | | | | | | | | 1 | | | | 1 |

For the easier reading of any number, first get the words at the head of the table by heart ; as units, tens, hundreds, thousands, &c. and apply them thus, 75, units, five ; and 7 tens, seventy ; that is seventy-five. Again, 678 ; 8 units, eight ; 7 tens, seventy ; and 6 hundreds, six hundred ; that is, six hundred seventy-eight. Once more, 3456 ; 6 units, six ; 5 tens, fifty ; 4 hundreds, four hundred ; 3 thousands, three thousand ; together, three thousand four hundred fifty-

The 4th line of the table, *viz.* 123456789, may be read thus, One hundred twenty-three millions, four hundred fifty-six thousands, seven hundred eighty-nine. But the manner of reading any number may be rendered more intelligible by stops, thus : make a comma after every third figure or cipher, beginning at the right hand, and so on towards the left, thereby distinguishing every third place into hundreds, as hundreds of units, hundreds of thousands, hundreds of millions, and hundred thousands of millions, &c. And for trial, let us read the first line of the table ; where the last place in valuation is hundred thousands of millions, and being pointed into periods will stand thus, 123,456,789,012 ; and is to be read thus, One hundred twenty-three thousand, four hundred fifty-six millions, seven hundred eighty-nine thousand, (no hundreds), and twelve. Again, the following number, *viz.* 276,245,678,921,460, is to be read thus ; 276 millions of millions, 245 thousands of millions, 678 millions, 921 thousands, 460 units or ones ; that is, Two hundred seventy-six millions of millions, two hundred forty-five thousand, six hundred seventy-eight millions, nine hundred twenty-one thousands, four hundred and sixty. The foregoing *table of numeration* is on the right hand distinguished into such periods, for the easier reading thereof ; and the like is frequently done in the public offices, and by men of business.

NUMBERS to be read or written, viz.

96, *Ninety-six.*

242, *Two hundred forty-two.*

7924, *Seven thousand 9 hundred 24.*

54006, *Fifty-four thousand and six.*

524707, *Five hundred 24 thousand 707.*

4706240, *Four millions 706 thousand 240.*

62700472, *Sixty-two millions 700 thousand 472.*

474960204, *Four hundred 74 millions 960 thousand 204.*

4214007042, *Four thousand 214 millions 7 thousand 42.*

44214800240, *Forty-four thousand 214 millions 8 hundred thousand 240.*

Of numerical letters.

Numbers were anciently expressed by letters; and it is necessary to understand them, for the reader reading the dates of years, frequently used in the title-pages of books, on funeral monuments in Roman history, &c.

I signifies *One.*

V *Five.*

X *Ten.*

L *Fifty.*

C *An hundred.*

CC *Two hundred.*

D or IJ *Five hundred.*

M or CIJ *A thousand.*

IJJ *Five thousand.*

CCIJJ *Ten thousand.*

IJJJJ *Fifty thousand.*

CCCCIJJJJJ *A hundred thousand.*

IJJJJJJ *Five hundred thousand.*

CCCCCIJJJJJJ *Ten hundred thousand, or a million.*

MDCCLXXI expresses the present date of 1771, M being one thousand, D five hundred, CC two hundred, LXXI seventy-one, together, One thousand seven hundred and seventy-one.

When a letter of inferior value stands after one of superior, its value is to be added thereto, thus VI. VII. and VIII. signify six, seven, and eight; but when a letter of inferior value is placed before one of superior, then its value is to be taken therefrom, thus IV. IX. XL. and XC. signify four, nine, forty, and ninety.

A D D I T I O N

IS the putting together two or more numbers or sums, so as their total value may be discovered or known.

Herein we must always observe to set the numbers to be added, orderly one under the other; that is, units under units, tens under tens, hundreds under hundreds, &c. as in the subsequent examples.

Addition of numbers of one denomination.

| Yards. | Gallons. | Pounds. |
|-------------|---------------|-------------------|
| T.U. | H.T.U. | X of Th.Th.H.T.U. |
| 2 4 | 7 5 6 | 5 7 9 6 2 |
| 4 2 | 4 3 2 | 3 9 7 4 4 |
| 6 8 | 5 7 8 | 6 7 2 2 2 |
| 8 6 | 6 9 6 | 7 9 6 7 4 |
| 2 4 | 4 2 2 | 2 4 9 2 |
| 4 2 | 6 7 8 | 3 9 0 |
| <hr/> 2 8 6 | <hr/> 3 5 6 2 | <hr/> 2 4 7 4 8 4 |

In addition of simple numbers, whether it be yards, gallons, pounds, or any thing else, remember to carry for every 10 that you find in the right-hand row or rank of figures, being units, to the next row of tens; and the like from the rank of tens to the row of hundreds, &c.; and whatever it makes in the last row, you must set down, amount to what it will.

The numbers above are set down in order, as before directed; that is, units under units, tens under tens, &c. as may be plainly understood, by being indicated at the head of each row or rank, by U. T. H. &c. signifying units, tens, hundreds, &c. Then in casting up each example, to know its total, I begin at the right hand, or units rank of the first example, and say, 2 and 4 is 6, and 6 is 12, and 8 is 20, and 2 is 22, and 4 is 26; in which row there are two tens and 6 over; wherefore I set down 6 just under its own rank, and carry two to the next row, and say, 2 that I carry and 4 make 6, and 2 is 8, and 8 is 16, and 6 is 22, and 4

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is 26, and 2 is 28; and this being the last row, I set down the amount, *viz.* 28; so that the total number of yards is found to be 286. And the amount of the next or 2d example is found, by the same method, to be 3562 gallons. And in the third and last example the total number of pounds is found, by the same way to be 247484. And so the total of any other example of the same kind, *viz.* simple numbers of one denomination, may be found. *Note,* That when any of the ranks amounts to just 10, 20, 30, 40, 50, &c. then you must set down the 0 under its proper rank, and carry either 1, 2, 3, 4, or 5, according to the number of tens that you find, to the next row.

And so much for *addition of numbers of one denomination*, which never varies from what has been said above, observing strictly to keep to the critical, and nicely setting down in perpendicular order your several numbers, that units may precisely and directly stand under units, tens under tens, &c. as hath been fully declared before. The next in order of course is *addition of numbers of several denominations; or addition of money.*

In *England, or Great Britain*, accounts are kept in pounds, shillings, pence, and parts of a penny; so you are to note, that

4 Farthings make one penny,
12 Pence 1 shilling, and
20 Shillings 1 pound.

In adding of these, you are, with the same punctuality, to mind, that pounds be set directly under pounds, shillings under shillings, pence under pence, and farthings under farthings; as in the examples hereafter following.

But before you proceed, it will be necessary to have the following tables by heart, for the readier remembrance of how many shillings there are in a number of pence, and how many pounds are contained in a number of shillings, &c.

Note, That *l.* stands for pounds, *s.* for shillings, *d.* for pence, and *q.* for farthings, those being the initial letters of *libra, solidus, denarius, and quadrans*, Latin words of the same signification.

Pence

| Pence | s. | d. |
|-------|----|----|
| 20 is | 1 | 8 |
| 30— | 2 | 6 |
| 40— | 3 | 4 |
| 50— | 4 | 2 |
| 60— | 5 | 0 |
| 70— | 5 | 10 |
| 80— | 6 | 8 |
| 90— | 7 | 6 |
| 100— | 8 | 4 |
| 110— | 9 | 2 |
| 120— | 10 | 0 |

| s. | l. | s. |
|-------|----|----|
| 30 is | 1 | 10 |
| 40— | 2 | 0 |
| 50— | 2 | 10 |
| 60— | 3 | 0 |
| 70— | 3 | 10 |
| 80— | 4 | 0 |
| 90— | 4 | 10 |
| 100— | 5 | 0 |
| 110— | 5 | 10 |
| 120— | 6 | 0 |

The use of these tables is this: whenever you are casting up any sum of money, you begin at the right hand, (as before in sums of one denomination), suppose at the place of pence, then if the rank, row, or denomination of pence, amounts, from the bottom to the top, to 56, your table of pence tells you, that 50 d. is 4 s. and 2 d. to which adding 6 d. the sum is 4 s. 8 d.; if to 92 d. the table tells you, that 90 d. is 7 s. 6 d. which with 2 d. over is 7 s. 8 d.; and if to 81 d. the table shews, that 80 d. is 6 s. 8 d. and 1 d. more makes 6 s. 9 d. &c.

The *shillings table* serves to lead you to a quick recollection how many pounds there are in so many shillings; as admit the rank of shillings arises to 57 s. the table says, that 50 s. is 2 l. 10 s. and 7 s. over make 2 l. 17 s.; if to 84 s. the table declares, that 80 s. is just 4 l. and 4 s. over make 4 l. 4 s.; if to 112 s. the table tells you, that 100 s. is 5 l. and 12 s. more make 5 l. 12 s. &c.

Addition of money.

Money owing, and money received, as follows.

(1)

(2)

| | l. | s. | d. |
|-------------|----|----|----|
| Mr Andrews | 4 | 12 | 6 |
| Mr Bent | 7 | 06 | 9 |
| Mr Crawley | 4 | 12 | 0 |
| Mr Dupper | 6 | 17 | 7 |
| Mr Edlin | 5 | 06 | 6 |
| Mr Franklin | 4 | 12 | 3 |
| Mr Gregory | 6 | 00 | 0 |
| Mr Fisher | 5 | 15 | 4 |

| | l. | s. | d. |
|-------------|----|----|----|
| Tobacco | 46 | 10 | 9 |
| Sugar | 79 | 16 | 0 |
| Indigo | 42 | 18 | 3 |
| Broad cloth | 66 | 12 | 4 |
| Canary | 90 | 16 | 0 |
| Port wine | 84 | 07 | 6 |
| Rice | 24 | 12 | 0 |
| Logwood | 60 | 10 | 0 |

45 02 11

496 02 10

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I

I begin with the right-hand rank, that is, the pence in the example of money owing, and say, 6 and 3 is 9, and 6 is 15, and 7 is 22, and 9 is 31, and 6 makes 37 pence; now 30 pence, according to the table, is 2 s. 6 d. and 5 d. more makes 2 s. 11 d. I set down 11 exactly under the rank of pence, and say shillings that I carry (which I do to the rank of shillings) and 5 is 7, and 2 is 9, (for I take first only the units rank of shillings), and 6 is 15, and 7 makes 22, and 2 is 24, and 6 is 30, and 2 makes 32: and now being come to the top of the sum, and it making 32, I come down with the tens of shillings, saying 32 and 10 is 42, and 10 is 52, and 10 is 62, and 10 is 72, and 10 makes 82 shillings; and the table telling me that 80 shillings is 4 pounds, I know therefore 82 s. is 4 l. 2 s. wherefore I set down the odd 2 s. just under the row of shillings, and carry 4 pounds to the pounds; saying, 4 that I carry and 5 is 9, and 6 is 15, and 4 is 19, and 5 is 24, and 6 is 30, and 4 is 34, and 7 is 41, and 4 makes 45 pounds: so that the total of those several sums of money, due to the several persons, amounts to 45 l. 2 s. 11 d.

In the example of money received, I begin at the right-hand rank, as before, and say, 6 and 4 is 10, and 3 is 13, and 9 makes 22; and 22 pence being 1 l. and 10 d. I set down 10, and carry 1 s. to the shillings; saying, 1 that I carry and 2 is 3, and 7 is 10, and 6 is 16, and 2 is 18, and 8 is 26, and 6 makes 32; then I come down with the tens, saying 32 and 10 makes 42, &c. and find at the bottom it comes to 102 shillings, which makes 5 l. 2 s. I set down 2 s. and carry 5 l. to the pounds; saying, 5 that I carry and 4 is 9, &c. I find that at the top it amounts to 36; wherefore I set down 6 exactly under its own rank, viz. the rank of units of pounds, and carry 3 for the 3 tens that are in 30, for at all times in the addition of the left-hand denomination, whether it be money, weight, or measure, that is, in the denomination of pounds, tuns, or yards, you must for every ten carry one to the next row, &c. saying, 3 that I carry and 6 is 9, and 2 is 11, and 8 is 19, &c. and I find that at the top it comes to 49; wherefore I set down 49 to the left hand of the 6; and the total amount of the money

Money received for those particular goods or wares sold, is 496 l. 2 s. 10 d.

More examples for practice.

| | l. | s. | d. | l. | s. | d. | l. | s. | d. |
|------------|-----|----|-----------------|------|----|-----------------|----|----|----|
| Mr Money | 17 | 12 | 6 $\frac{1}{4}$ | 146 | 12 | 3 $\frac{1}{2}$ | 4 | 10 | 6 |
| Mr Gaunt | 26 | 10 | 2 | 278 | 10 | 9 | 0 | 07 | 9 |
| Mr Hern | 50 | 00 | 0 | 46 | 16 | 6 | 1 | 00 | 0 |
| Mr James | 44 | 12 | 8 $\frac{1}{2}$ | 100 | 00 | 0 | 1 | 01 | 0 |
| Mr King | 60 | 14 | 0 | 72 | 12 | 4 | 0 | 04 | 6 |
| Mr Long | 29 | 16 | 6 $\frac{3}{4}$ | 69 | 16 | 6 $\frac{3}{4}$ | 0 | 10 | 0 |
| Mr Monk | 16 | 10 | 0 | 460 | 12 | 6 | 4 | 14 | 4 |
| Mr Napper | 20 | 00 | 0 | 49 | 10 | 0 | 0 | 07 | 6 |
| Mr Oliver | 27 | 11 | 4 $\frac{1}{2}$ | 7 | 12 | 4 $\frac{1}{2}$ | 0 | 01 | 6 |
| Mr Perkins | 17 | 04 | 0 | 22 | 10 | 0 | 0 | 02 | 6 |
| Mr Quinton | 20 | 10 | 3 | 164 | 12 | 9 | 3 | 10 | 9 |
| Mr Roper | 46 | 16 | 8 | 75 | 10 | 6 | 1 | 10 | 0 |
| Total | 377 | 18 | 3 | 1494 | 16 | 6 $\frac{3}{4}$ | 18 | 00 | 4 |


Addition of Avoirdupois weight.

By this weight are weighed all kinds of grocery goods or wares, or goods subject to waste; as tobacco, sugar, fruit, and drugs; as also flesh, butter, cheese, tallow, iron, brass, copper, lead, tin, or pewter, pitch, tar, rosin, hemp, flax, soap, salt, &c.

A table of this weight is as follows, viz.

| | |
|-------------------------------------|-------------|
| 4 Quarters make 1 dram | Marked dr. |
| 16 Drams 1 ounce | oz. |
| 16 Ounces 1 pound | lb. |
| 28 Pounds 1 qr. of a hundred weight | qrs. |
| 4 Quarters 1 hundred weight | C. |
| 20 Hundred weight 1 tun | T. |
| 10 4 28 | 10 4 28 |
| C. qrs. lb. | C. qrs. lb. |
| 5-1-16 | 24-1-12 |
| 4-2-24 | 42-2-00 |
| 6-3-06 | 16-1-12 |
| 7-1-12 | 25-3-24 |
| 9-0-20 | 19-0-20 |
| 6-2-00 | 26-1-22 |
| 37-3-22 | 154-3-06 |
| | 34-3-15 |
| | 206-09-11 |

In these examples the manner of proceeding is the same as in the former, observing, that the number of units of each lesser denomination, which makes a unit of the next greater, found by the preceding table, is placed above each rank of numbers; that is to say, in the first example, 28, the number of pounds contained in a quarter of an hundred weight, is placed over the column of pounds; now, that column when added up, makes 78, which contains two 28's and 22 over, wherefore I set down 22 under the column of pounds, and carry 2 to the column of quarters, and so on.

 *Note*, That in weighing at the water-side, or elsewhere, they do not weigh by the tun, though some goods are sold by it, as *iron, logwood, cheese, &c.* but by the hundreds, quarters, and pounds, which are afterwards reduced to and computed by tuns.

Addition of Troy weight.

By this weight are weighed *jewels, gold, silver, pearls, and medicines*, and the usual denominations are *pounds, ounces, pennyweights, and grains*, as in the following table, viz.

24 Grains make 1 pennyweight,
20 Pennyweight 1 ounce, and
12 Ounces 1 pound Troy.

Examples of Troy weight.

| 6 Ingots of sily. wt. viz. | | | | 10 12 20 24 | | | | 12 20 24 | | | |
|----------------------------|-----|-----|-----|--------------|-----|-----|-----|-----------|-----|-----|-----|
| No | lb. | oz. | pw. | gr. | lb. | oz. | pw. | gr. | oz. | pw. | gr. |
| 1 wt | 4 | 05 | 12 | 10 | 14 | 06 | 10 | 11 | 204 | 10 | 14 |
| 2 | 5 | 04 | 16 | 17 | 24 | 10 | 11 | 12 | 96 | 07 | 17 |
| 3 | 3 | 11 | 19 | 20 | 21 | 06 | 07 | 17 | 100 | 11 | 12 |
| 4 | 4 | 06 | 07 | 12 | 22 | 10 | 12 | 14 | 56 | 16 | 20 |
| 5 | 5 | 01 | 11 | 12 | 16 | 11 | 12 | 13 | 212 | 10 | 23 |
| 6 | 4 | 11 | 12 | 13 | 21 | 07 | 06 | 17 | 96 | 19 | 12 |
| <hr/> | | | | <hr/> | | | | <hr/> | | | |
| 28 06 00 12 | | | | 122 05 01 12 | | | | 767 17 02 | | | |
| <hr/> | | | | <hr/> | | | | <hr/> | | | |

If what was before said be duly observed, the performance of the above examples will be attended with no difficulty.

How

How to prove addition.

IN all additions, whether of simple numbers, that is, numbers of one denomination; or in examples compound, that is, of divers denominations, as *pound, shillings, pence, and farthings*, &c. the readiest method of proof is to cast the same downwards, (beginning at the top, as you did the same upwards beginning at the bottom), and if that operation produces the same total, the work is infallibly right, and beyond any contradiction; and this is much better, and more feasible, than the common method used in schools, of making two totals, by omitting the upper line in the second. I might here also give several examples of other additions, such as *Apothecaries weight, cloth, liquid, dry, and long measures, time*, &c.; but the method serves for any of them, having respect to the tables belonging to those several denominations, which are as follows, viz.

A table of the parts of Apothecaries weight.

| | Marks |
|----------------------|--------------|
| 20 Grains 1 Scruple. | ℞ a Scruple. |
| 3 Scruples 1 Drachm. | ʒ a Drachm. |
| 8 Drachms 1 Ounce. | ℥ an Ounce. |
| 12 Ounces 1 Pound. | ℔ Pound. |

By these weights they compound their medicines; but they buy and sell their drugs by *Avoirdupois weight*.

Cloth Measure.

| | |
|-----------------------|-----------------|
| 4 Nails, or 9 Inches, | 1 qr of a Yard. |
| 4 qrs, or 36 Inches, | 1 Yard. |
| 5 qrs, or 45 Inches, | 1 Ell English. |
| 3 qrs, or 27 Inches, | 1 Ell Flemish. |
| 6 qrs, or 54 Inches, | 1 French Ell. |

A table of Wool weight.

Note, That 7 lb. make 1 Clove; 2 Cloves, or 14 lb. 1 Stone; 2 Stones, or 28 lb. 1 Todd; 6 Todd and $\frac{1}{2}$. 1 Wey, or 182 lb.; 2 Weys, or 364 lb. 1 Sack; and 12 Sacks 1 Last, or 4368 lb.; 240 lb. 1 Pack of wool.

Note, That 1 lb. 2 oz. 12 pw. Troy, is equal to a pound *Avoirdupois*. And a pound Troy is about 13 oz. 2 drams and a half *Avoirdupois*.

| | | <i>l. s. d.</i> |
|--------------------------------|------------------------|----------------------|
| A Pound weight Troy | } of silver is worth } | 3 02 2 |
| A Pound wt. <i>Avoirdupois</i> | | 3 15 3 $\frac{1}{2}$ |
| | | 100 l. |

100 l. $\left\{ \begin{array}{l} \text{in Gold} \\ \text{in Silver} \end{array} \right\}$ weighs $\left\{ \begin{array}{l} 1 \ 11\frac{3}{4} \\ 26 \ 04 \end{array} \right\}$ Avoird. wt.

A pound *Avoirdupois* is heavier than a pound *Troy* but an ounce *Troy* is heavier than an ounce *Avoirdupois*.

A table of liquid Measure.

Liquid measure is of two sorts, viz. one for wine, brandy, &c. and the other for beer and ale.

Wine, &c.

| | |
|------------------------|----------------------------|
| 8 Pints 1 Gallon | 2 Hogsheds 1 Pipe or Butt |
| 42 Gallons 1 Tierce | 2 Pipes or Butts 1 Tun, or |
| 63 Gallons 1 Hogshhead | 252 Gallons |
| 84 Gallons 1 Puncheon | |

Note, That *sweet oil* hath 236 gallons to the tun, but oil from *Greenland* hath 252 gallons to the tun.

Note, The wine gallon contains 231 cubic or solid inches, by which all liquids are measured, except beer and ale.

Beer-measure.

| | |
|-----------------------|-------------------------------|
| 8 Pints 1 Gallon | 2 Kilderkins 1 Barrel, or 36 |
| 9 Gallons 1 Firkin | Gallons |
| 4 Firkins 1 Kilderkin | 1 Barrel and half, or 52 Gal- |
| | lons 1 Hogshhead |

Ale-measure.

| | |
|----------------------------|-------------------------------|
| 8 Pints 1 Gallon | 2 Kilderkins 1 Barrel, or 32 |
| 8 Gallons 1 Firkin of ale, | Gallons |
| soap, or herrings | 1 Barrel and half, or 48 Gal- |
| 2 Firkins 1 Kilderkin | lons, 1 Hogshhead |

Note, The beer and ale gallon are the same, viz. 282 solid inches; but with this difference, i. e. the barrel of beer contains 1228 cubic inches, or 4 gallons more than the barrel of ale.

In a Tun of wine are

2 Pipes or Butts
6 Tierces
252 Gallons
504 Pottles
1008 Quarts
2016 Pints

In a Pipe or Butt are

2 Hogshheads
3 Tierces
126 Gallons
252 Pottles
504 Quarts
1008 Pints

In a Puncheon are

| | |
|-----|---------|
| 4 | Firkins |
| 30 | Gallons |
| 72 | Pottles |
| 144 | Quarts |
| 288 | Pints |

In a Hogshead are

| | |
|----|------------|
| 2 | Kilderkins |
| 4 | Firkins |
| 32 | Gallons |
| 64 | Pottles |

In a Barrel of beer are

| | |
|-----|--------|
| 128 | Quarts |
| 256 | Pints |

In a Barrel of ale are

| | |
|----|------------|
| 2 | Kilderkins |
| 4 | Firkins |
| 32 | Gallons |
| 64 | Pottles |

Dry Measure.

| | |
|-----|--------------------------------|
| 2 | Pints 1 Quart |
| 4 | Quarts 1 Pottle |
| 8 | Pottles 1 Gallon |
| 16 | Gallons 1 Peck |
| 32 | Pecks 1 Bushel land-measure |
| 64 | Pecks 1 Bushel water-measure |
| 128 | Bushels 1 Comb or half Quarter |
| 256 | Combs 1 Quarter |

Salt and sea-coal are heaped, or else there are five pecks to the bushel.

In the Last are

| | |
|------|----------|
| 2 | Weys |
| 10 | Quarters |
| 80 | Bushels |
| 320 | Pecks |
| 1280 | Pottles |
| 2560 | Quarts |
| 5120 | Pints |

Quarters 1 Chalder

Quarters 1 Wey

Weys 1 Last, or 10 Qrs.

Fatts or Vatts, or 36 Bushels of sea-coal, 1 Chalder; and 21 Chalder is accounted a score in the river Thames

In a Wey are

| | |
|------|---------|
| 5 | Quarts |
| 40 | Bushels |
| 160 | Pecks |
| 320 | Gallons |
| 640 | Pottles |
| 1280 | Quarts |
| 2560 | Pints |

Note, By an act anno 1712, the bushel is 21 7/8 cubic inches; and a gallon of this measure is 272 1/4 cubic inches.

Long Measure.

| | | | |
|----|---------------------------------------|----|--------------------------------|
| 3 | Barley-corns 1 Inch | 6 | Feet 1 Fathom or 2 Yds. |
| 12 | Inches 1 Foot | 40 | Poles or 220 Yards, 1 Furlong |
| 3 | Feet 1 Yard | 8 | Furlongs 1 Mile, or 1760 Yards |
| 5 | Feet 9 inches, 1 Ell Eng. | 3 | Miles 1 League |
| 5 | Feet a geometrical pace | | |
| 5 | Yards and half 1 Pole, Perch, or Rood | | |

In

In a Mile are

| | |
|------------|---------------------|
| 8 Furlongs | 5280 Feet |
| 320 Poles | 63360 Inches |
| 1760 Yards | 190080 Barley-corns |

Land measure.

- 5 Yards and 1 half, 1 Pole, Perch, or Rood.
 48 Poles make 1 Furlong, or quarter of an acre.
 160 Poles in length, and 1 in breadth, is 1 acre.
 80 Poles in length, and 2 in breadth, 1 acre; and
 40 Poles in length, and 4 in breadth, 1 acre.
 4 Poles in length, make 1 chain.
 10 Chains in length, and 1 in breadth, make 1 acre

Time.

| | |
|---|--|
| 60 Seconds 1 Minute | |
| 60 Minutes 1 Hour | |
| 24 Hours 1 natural Day | <i>In a Year are</i> 31557600 Seconds |
| 7 Days 1 Week | 525960 Minutes |
| 4 Weeks 1 Month | 8766 Hours |
| 13 Months 1 Day and 6 Hours, 1 Solar Year | 365 Days 6 Hours |

Note, The year is also divided into 12 calendar months, which contain 365 days, according to the good old verse, *viz.*

*Thirty days hath September, April, June, and November;
 February hath 28 alone, and all the rest have thirty-one.*

SUBTRACTION.

THE next rule in *Arithmetic* is *subtraction*, (commonly, but erroneously, called *substraction*); and this rule teaches to take a lesser number out of a greater, and sheweth the remainder, excess, or difference.

Place the lesser number under the greater, (with the same care, and in the same order as in addition), draw a line under them, and beginning at the right hand, take each figure in the lower line from the figure under which it stands: but if the figure in the lower line is greater than that in the upper, then in numbers of one denomination, ten must be borrowed, and added to the figure in the upper line; then take the figure in the lower line from the sum, and write down the remainder, but for every ten thus borrowed,

one

must be paid or added to the next left-hand figure in the lower line. *Example:* Suppose Mr. Andrews owes to Mr. Baker 323 *l.* whereof Mr. A. hath paid to Mr. B. the sum of 146 *l.* in part; what remains due to Mr. B. ? *Ans.* —

177 *l.*

Here the lesser number 146, stands under the greater 323; and to find the remainder, or sum remaining due, I say 6 from 3 I cannot; but 6 from 13 (for you borrowed 10, and add to it the figure or cipher that stands directly over the figure you subtract) and there remains 7; then 1 that I borrowed and 4 is 5, for as I borrowed 10 in the inferior place, which is equal to one in the superior, so I must now pay the same; therefore I say, 5 from 2 I cannot; but 5 from 12 (borrowing 10, and adding it to the figure 2, as above directed) and there remains 7; then 1 that I borrowed and 1 is 2, from the 3 figure above it, and there remains 1, and so the example is done; and by it is shewn that A. still owes B. 177 pounds. For a proof of its verity, add 177 the remainder, to 146 the lesser of the two given numbers, and it will make 323, being the same with the greater number or sum of money first due; and therefore is a sure proof of the truth and certainty of the rule. And as subtraction is proved by addition, so may addition be proved by subtraction: for if the two aforesaid numbers, viz. 323 and 146, are added, their total is 469; from which if you deduct 146, the remainder will be the greater number; or if you subtract 323 from the said 469, the remainder will be 146, the lesser number.

All examples in subtraction of numbers of one denomination are performed as above, they varying not at all: but however, once more, for the better explanation, admit, a great sheep-master hath in all 6904 sheep, and takes out of them 2490 to dispose of at market; how many doth he leave behind? To know this set them down thus:

From—6904 the greater number,
Take—2490 the lesser number.

Answer 4414

Here

Here I say 0 from 4 and there remains 4; then from nothing (or 0) I cannot; but nine from 10 (adding 10 to the 0) and there remains 1; then 1 that borrowed and 4 make 5; and 5 from 9, and there remains 4; and lastly 2 from 6, and there remains also 4, (for I borrowed none, and therefore there is no occasion of paying); so that he leaves behind him just 4414; which put to the number he takes to market makes the number he first had, *viz.* 6904, and shews the deduction to be true, and the answer right.

More examples for practice.

| | <i>l.</i> | <i>Yards.</i> | <i>Gallons.</i> | <i>Pounds.</i> |
|-------|-----------|---------------|-----------------|----------------|
| From | 4796 | 3700 | 47200 | 47967 |
| Take | 2929 | 1976 | 31976 | 9769 |
| | <hr/> | <hr/> | <hr/> | <hr/> |
| Rem. | 1867 | 1724 | 15224 | 38197 |
| | <hr/> | <hr/> | <hr/> | <hr/> |
| Proof | 4796 | 3700 | 47200 | 47967 |
| | <hr/> | <hr/> | <hr/> | <hr/> |

The distance of time, since any remarkable event, may be found, by subtracting the date thereof from the date of the present year.

Examples.

| | |
|--------------------------|----------------------------|
| I.—1771 | II.—1771 |
| 1666 the fire of London. | 1588 the Spanish invasion. |
| <hr/> | <hr/> |
| Since 105 years. | Since 183 years. |
| <hr/> | <hr/> |
| | III.—1771 |
| | 1605 gunpowder treason. |
| | <hr/> |
| | Since 166 years. |
| | <hr/> |

Subtraction of divers denominations.

Here if the figure or figures, placed in the lower line, exceed those in the upper, then, as many units must be borrowed as make an unit, or one, of the next superior denomination; and one must be carried to the next left-hand place in the lower line, as before.

Of Money.

Suppose Mr Champion owes Mr Darnell 9 *l.* 2 *s.* 6 *d.* and Mr C. hath paid Mr D. in part 6 *l.* 16 *s.* 4 *d.* what remains due to Mr Darnell? *Answer*, there is due to Mr Darnell 2 *l.* 6 *s.* 2 *d.*

Again, Mr Edwards sells to Mr Francis Spanish wool, to the value of 242 *l.* 16 *s.* 3 *d.* $\frac{3}{4}$, and pays present money, the sum of 174 *l.* 12 *s.* 6 *d.* $\frac{1}{2}$; what money remains unpaid from Mr Francis? *Answer*, 68 *l.* 3 *s.* 9 *d.* $\frac{1}{4}$

In the first of these examples, I say, 4 *d.* from 6 *d.* and there remains 2 *d.* then 16 *s.* from 2 *s.* I cannot, but borrowing one integer of the next denomination, or 1 pound, which is 20 *s.* I say, 16 from 20 and there rests 4, and adding thereto the number 2, it makes 6; wherefore I put down 6 in the place of shillings, and say, 1 that I borrowed and 6 is 7; now 7 *l.* from 9 *l.* there remains 2 *l.*: so the money resting due to Mr Darnell is 2 *l.* 6 *s.* and 2 *d.* as in the example.

In the second example, I say, 2 farthings (or an half-penny) from 3 farthings, and there remains 1 or $\frac{1}{2}$, which I set down in its proper place, *viz.* under the denomination of farthings; then 6 from 3 I cannot, but 6 from 12 (as marked over the denomination) and there remains 6, and 3 *d.* over it makes 9 *d.* which I place under the line in its right place, *viz.* of pence; then 1 that I borrowed (that is 1 shilling) and 12 is 13: 13 *s.* from 16 *s.* and there rests 3, which I likewise set down under its own rank; then 4 from 2 I cannot, but 4 from 12 (borrowing 10) and there rests 8; then 1 that I borrow and 7 makes 8; 8 from 4 I cannot, but 8 from 14 and there remains 6: so that the sum remaining due is 68 *l.* 3 *s.* 9 *d.* $\frac{1}{4}$, as in the work. For its proof, you must add the remainder 68 *l.* 3 *s.* 9 *d.* $\frac{1}{4}$ to the lesser or under sum 174 *l.* 12 *s.* 6 *d.* $\frac{1}{2}$, and it makes 242 *l.* 16 *s.* 3 *d.* $\frac{3}{4}$, the sum first due, and is a proof of the work's being right.

More examples for practice.

| 12 | 20 | 12 | 4 | 10 | 20 | 12 | 10 | 20 | 12 |
|------------|-----------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|
| <i>l.</i> | <i>s.</i> | <i>d.</i> | | <i>l.</i> | <i>s.</i> | <i>d.</i> | <i>l.</i> | <i>s.</i> | <i>d.</i> |
| Due—174 | —16 | —6 | $\frac{1}{4}$ | 74 | —10 | —4 | 2471 | —07 | —0 |
| Paid—97 | —12 | —4 | $\frac{3}{4}$ | 29 | —12 | —9 | 1976 | —16 | —6 |
| Remain 77 | —04 | —1 | $\frac{1}{2}$ | 44 | —17 | —7 | 494 | —10 | —5 |
| Proof 174 | —16 | —6 | $\frac{1}{4}$ | 74 | —10 | —4 | 2471 | —07 | —0 |
| 10 | 20 | 12 | | 10 | 20 | 12 | 10 | 20 | 12 |
| 1st Due 74 | —00 | —00 | | 274 | —16 | —6 | 796 | —00 | —0 |
| Paid — 46 | —12 | —10 | | 197 | —19 | —4 | 279 | —11 | —7 |
| Balance 27 | —07 | —02 | | 76 | —17 | —2 | 516 | —08 | —5 |
| Proof 74 | —00 | —00 | | 274 | —16 | —6 | 796 | —00 | —0 |

Sometimes a sum owing may be paid at several times; then the several payments must be added together, and their total deducted from the sum first due, as in this and the examples following.

Owing—266 *l.*

| | |
|----------------------|------|
| <i>Paid at times</i> | { 20 |
| | { 15 |
| | { 30 |
| | { 90 |
| | { 17 |
| | { 24 |
| | { 60 |

Paid in all 256 deducted

Rests due 10

Proof 266

More

| | <i>l.</i> | <i>s.</i> | <i>d.</i> | | <i>l.</i> | <i>s.</i> | <i>d.</i> |
|----------------------------|-----------|-----------|-----------|--------------------------|-----------|-----------|-----------|
| More due | 249 | 12 | 0 | Received | 100 | 10 | 0 |
| Received at several times. | 24 | 12 | 6 | Paid to several persons. | 6 | 16 | 0 |
| | 9 | 14 | 9 | | 10 | 00 | 0 |
| | 20 | 00 | 0 | | 5 | 12 | 6 |
| | 16 | 16 | 6 | | 20 | 10 | 0 |
| | 22 | 10 | 2 | | 7 | 09 | 6 |
| | 13 | 12 | 6 | | 9 | 08 | 6 |
| | 7 | 16 | 4 | | 7 | 12 | 6 |
| Received in all | 115 | 02 | 9 | Paid in all | 67 | 09 | 0 |
| Refts due | 134 | 09 | 3 | Remains in the bag | 33 | 01 | 0 |
| Proof | 249 | 12 | 0 | | | | |

Avoirdupois Weight.

| <i>Tuns.</i> | <i>C.</i> | <i>qrs.</i> | <i>lb.</i> | <i>C.</i> | <i>qrs.</i> | <i>lb.</i> | <i>lb.</i> | <i>oz.</i> | <i>dr.</i> |
|--------------|-----------|-------------|------------|-----------|-------------|------------|------------|------------|------------|
| From 44 | 12 | 1 | 10 | 246 | 2 | 12 | 146 | 02 | 10 |
| Take 39 | 14 | 2 | 06 | 164 | 3 | 22 | 97 | 10 | 12 |
| | 4 | 17 | 3 | 81 | 2 | 18 | 48 | 07 | 14 |
| Proof 44 | 12 | 1 | 10 | 246 | 2 | 12 | 146 | 02 | 10 |

Troy Weight.

| <i>lb.</i> | <i>oz.</i> | <i>pwt.</i> | <i>gr.</i> | <i>oz.</i> | <i>pwt.</i> | <i>gr.</i> |
|-------------|------------|-------------|------------|------------|-------------|------------|
| From 462 | 04 | 10 | 11 | 1247 | 10 | 12 |
| Take 196 | 09 | 06 | 16 | 976 | 16 | 17 |
| Remains 265 | 07 | 03 | 19 | 270 | 13 | 19 |
| Proof 462 | 04 | 10 | 11 | 1247 | 10 | 12 |

And so much for *subtraction*; which method will serve for any denomination whatever, having respect to the several tables of quantity, as before hinted in addition.

MULTIPLICATION.

THE next rule in order is *multiplication*, and perhaps the most serviceable rule in business, for its quick dispatch, of all others in *arithmetic*; which I shall endeavour to show by its nature, quality, and use. Now,

1. *Multiplication* is a rule, that by two numbers given teacheth to find out a third, which shall contain either of the two as many times as the other containeth an unit.

2. *Multiplication* is also a compendious working of *addition*.

3. It serves likewise to bring great denominations into small, as pounds into shillings, pence, or farthings.

4. Having the length and breadth of a plane surface, we find its content in superficial or square measure.

5. By *multiplication* we find, having the value of one thing, or the wages of one person, how to know the value of many such things, or the wages of many such persons.

In *multiplication* we are particularly to take notice of these three terms, viz.

The { *Multiplicand,*
Multiplier, and
Product.

1. The *multiplicand* (generally the greater of the two numbers) is the number to be multiplied.

2. The *multiplier* (generally the lesser of the two numbers) is the number by which the former is to be multiplied.

3. The *product* is the result of the work, or answer. The *multiplier* and *multiplicand* are collectively called *factors*.

But before any procedure can be made in this rule, it is necessary to have the following table by heart, and that very perfectly.

MULTI-

MULTIPLICATION-TABLE.

| | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|-----|-----|-----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 |
| 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
| 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 |
| 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 |
| 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
| 11 | 22 | 33 | 44 | 55 | 66 | 77 | 88 | 99 | 110 | 121 | 132 |
| 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 | 120 | 132 | 144 |

This table is so plain and easy, that there is no need of direction ; for the product of any two figures will be found in that square, which is on a line with the one, and under the other ; thus 54, the product of 6 and 9, will be found on a line with 6, and under 9, or on a line with 9, and under 6 ; so 7 times 8 is 56, and 8 times 7 is 56, &c. And thus the table ought to be got by heart, for the more dexterous readiness in multiplying.

Now for application.

Example 1. How many are 3 times 472 ? Which being set down in the margin, I say, 3 times 2 is 6, which place under 3 the multiplier ; then 3 times 7 is 21 ; set down 1 under 7, and carry 2 for the two tens, as in addition of one denomination ; then 3 times 4 is 12, and 2 carried is 14 ; which set down, and the product is 1416 ; that is 3 times 472 makes so much : which may be proved by

H 2

addition,

addition, by setting down 472 three times, in addition order, and casting it up; which makes the assertion good in the second definition, that this rule compendiously performs the office of addition. Likewise the foregoing examples agree with the first definition, for as 3 times 472 make 1416, so doth 472 times 3 make the same, viz. 1416.

Example 2. Again, how many are produced by multiplying 742 by 4?

742 *Multiplicand*
 4 *Multiplier*,

 2968 *Product*

Here I say, 4 times 2 is 8, and times 4 is 16, 6 and carry one; and 4 times 7 is 28 and 1 is 29, which set down, so the whole product is 2968, as appears by the work.

More examples of one figure in the *multiplier* are these, viz.

| | | | | | |
|------------|-------|-------|-------|--------|--------|
| Multiplic. | 7420 | 4444 | 7460 | 90704 | 5670 |
| Multiplier | 5 | 6 | 7 | 8 | |
| Product | 37100 | 26664 | 52220 | 725632 | 511100 |

Compound Multiplication

Is when the *multiplier* consists of two, three, four or more figures or ciphers.

And here you must begin with that figure which is in the place of units of the *multiplier*, and go through the whole *multiplicand*, by multiplying each figure of it by that said unit-figure, then by the next, to wit by the figure in the place of tens of the *multiplier*; then with the third, &c. to the last; always remembering to place the first figure of every product or line (for you will ever have as many as you have significant figures in the *multiplier*), May, remember to place the first figure of each line exactly and perpendicularly under the figure you multiply by; and then add the several lines or products together, which so collected give the total product required, as in the examples following, viz.

Example

Example 1.

How many are 23 times 7426? First I begin with the unit-figure 3 in the *multiplier*, saying, times 6 is 18; 8 (which I set directly under by which I multiply) and carry 1; then 3 times 2 is 6, and 1 is 7; then 3 times 4 is 12; and carry 1; then 3 times 7 is 21, and 1 is 22; and so I have done with the first figure of the *multiplier*, viz. 3. Then I go to the next, that is 2, and twice 6 is 12; 2 and I carry 1, (which 2 is placed in a direct line under 2, the multiplying figure); then twice two is 4, and 1 is 5; then twice 4 is 8; and lastly, twice 7 is 14, which I set down; then I add the two products together, saying, 8 is 8, &c. and the total is the true product or result of the multiplication, viz. 170798. Again,

Example 2.

What is the product of 527527
multiplied by 285

It will appear too prolix, and altogether unnecessary, to give more verbal directions; nay, indeed nauseous tautology, since those given above are sufficient; and therefore the learner is referred to the observation of the example, as also to those two that follow, viz.

| | |
|------------|------------|
| 527535 | 275827 |
| 15728 | 19725 |
| <hr/> | <hr/> |
| 4220280 | 1379135 |
| 1055070 | 551654 |
| 3692745 | 1930789 |
| 2637675 | 2482443 |
| 527535 | 275827 |
| <hr/> | <hr/> |
| 8297070480 | 5440687575 |

When ciphers are intermixed with figures in the *multiplier*, then multiply by the figures as above; and when you come to a cipher in the *multiplier*, then set down another cipher exactly and perpendicularly under it, then begin the *multiplicand* again with the next figure to the

the cipher in the *multiplier*, and go through it in the same line, placing the first figure of that product next to the cipher towards the left hand; but then heed must be taken that the next figure or cipher of the next line must be set down one degree farther towards the left hand, and not immediately under the last figure set down to the cipher; as in the following examples may be fully understood.

| | | |
|---------|--------------|------------|
| 24393 | 7864371 | 327586 |
| 402 | 23604 | 6030 |
| <hr/> | <hr/> | <hr/> |
| 48786 | 31457484 | 9827580 |
| 975720 | 471862260 | 19655160 |
| <hr/> | 23593113 | <hr/> |
| 9805986 | 15728742 | 1975343580 |
| <hr/> | <hr/> | <hr/> |
| | 185630613084 | |
| | <hr/> | |

When you have a cipher or ciphers in the *multiplier*, at the beginning towards the right hand, then set it or them backwards from the place of units towards the right hand: and when you have multiplied by the figure or figures, annex the cipher or ciphers:

As in these examples.

| | | |
|--------|----------|----------|
| 4762 | 47962 | 4632 |
| 70 | 400 | 2600 |
| <hr/> | <hr/> | <hr/> |
| 333340 | 19184800 | 27792 |
| <hr/> | <hr/> | 9264 |
| | | <hr/> |
| | | 12043200 |
| | | <hr/> |

If you have ciphers both in the *multiplicand* and *multiplier*; then neglect the ciphers in both, and multiply by the figures, and annex the ciphers at last:

As in these examples.

| | | |
|---------|-----------|-----------|
| 42600 | 42300 | 376400 |
| 220 | 12000 | 2400 |
| <hr/> | <hr/> | <hr/> |
| 852 | 846 | 15056 |
| 852 | 423 | 7528 |
| <hr/> | <hr/> | <hr/> |
| 9372000 | 507600000 | 903360000 |
| <hr/> | <hr/> | <hr/> |

When

When you are to multiply by 10, 100, 1000, 10000, is only adding or annexing so many ciphers to the *multiplicand*, that is, either 1, 2, 3, or 4 ciphers, and the work is done. *Example*, Suppose I am to multiply 375 by the numbers above; if I multiply it by 10, then I join 0 to 375, and then it makes, or the product is 3750; if by 100, then I annex 00, and then it makes 37500; if by 1000, I put to it 000, and then it produces 375000; and lastly, if by 10000, I then add 0000, and then it makes 3750000, &c. And thus any number be multiplied, when the *multiplier* consists of an unit with any number of ciphers, and done by inspection only, without any formal setting down the *multiplicand* with a line drawn under it, &c. Thus far for direction in the manner how to multiply; the next will be to show the uses of *multiplication* in real business, and how to apply it on proper occasions, viz.

1. Suppose you want to know how many half-crowns there are in 246 *l.* you know that 8 half-crowns make *l.* wherefore set them down thus:

$$\begin{array}{r} 246 \text{ } l. \\ \text{Multiply by } 8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Answer } 1968 \\ \hline \end{array}$$

Again, in 1968 half-crowns, how many pence?
30 pence, in half a crown.

$$\begin{array}{r} 59040 \text{ pence, the answer.} \\ \hline \end{array}$$

And this serves to make out, that great denominations are brought into smaller by this rule, according to the third definition.

2. Admit you wanted to know the contents of a large shuffle-board table, 34 feet long, and 4 feet wide, multiply 34 the length, by 4 the breadth, and the answer will be 136 square feet for the true contents of such a table. And this agrees with the 4th definition of this rule.

3. If I know the value of a yard of broad cloth to be 12 shillings, what is the value of 220 yards of the said cloth in shillings.

Multiply

$$\begin{array}{r}
 \text{Multiply by} \quad 220 \\
 \quad \quad \quad 12 \\
 \hline
 \quad \quad \quad 440 \\
 \quad \quad 220 \\
 \hline
 \end{array}$$

Answer 2640 shillings, or 132 pounds.

If the wages of 1 seaman be 23 shillings a-month, what is the wages of 250 seamen for the same time?

$$\begin{array}{r}
 \text{Multiply by} \quad 23 \\
 \hline
 \quad \quad \quad 750 \\
 \quad \quad 500 \\
 \hline
 \end{array}$$

Answer 5750 shillings, or 287 l. 10s.

And these two examples accord with the fifth definition, or use of this rule.

And thus much for common *multiplication*.

I shall, in the next place, say some small matter concerning *multiplication of money*, and a little of its use, and so conclude this rule.

Multiplication of Money.

Multiplication of money (what most would learn above any thing) hath great affinity with *addition of money*; the same method being taken in carrying from one denomination to the next, viz. from farthings to pence, from pence to shillings, and from shillings to pounds. And as in *addition* (and other *multiplications*) you begin at the right hand, and proceed towards the left; so here you begin at the least denomination, which is also at the right hand.

This method of accounting is the most apt and expeditious of all others, for small quantities; and therefore extremely necessary in making bills of parcels, &c.: and is, beyond all contradiction, as sure and certain as any way whatsoever.

The general rule

Is always to multiply the price by the quantity.

The first step is, for quantities from 2 to 12; and this is done by one multiplier; as in the examples following.

Example

Example 1.

l. s. d.

Multiply 7—12—6
 for 6 pieces of cloth at *l. 7 12 6 per piece*) by 6
 45—15—0

Here I say 6 times 6 is 36 pence, which is just 3 *s.* set down 0 in the place of pence, and carry 3 *s.* to the place of shillings, (exactly the same as in *addition money*); then 6 times 12 is 72, and three is 75 *s.* or *l. 15 s.* wherefore I set down 15 in the place of shillings, and carry 3 to the pounds; then 6 times 7 is 42, and 3 is 45 *l.* So the whole amount of the six cloths, at 7—12—6 *per cloth*, is 45 *l. 15 s.* as in the work, which is very concise.

Example 2.

Again, how much is 9 times 13 *s. 4 d.* or what is the amount of 9 merks?

In this example I say 9 6—00—0
 times 4 is 36 *d.* or 3 *s.* I set down 0, and carry 3; then 9 times 3 is 27, and 3 makes 30; I set down 0, and carry 3 (as in multiplication of simple numbers); then 9 times 1 is 9, and three is 12, which is in the place of tens of shillings, and being halved, make just 6 *l.* and so much is the value of 9 merks.

Example 3.

Once more; What comes 12 gallons of wine to at *s. d.*
l. 4 d. per gallon?

Here I say, 12 times 4 is 48; 0 and carry 4; then 12 times 5 is 60, and 4 is 64 *s.* or 3 *l. 4 s. &c.*
l. 3—4—0

The next degree or step of advance in this way of reckoning, is of quantities exceeding 12, even to 12 times 12, or 144; all which, as far as 144, are found in that excellent table, *the table of multiplication*; which is a ready help to all purposes of reckoning, and particularly in this way: and that you may proceed with dexterity, you must be very ready in the said table, that you may be immediately apprehensive what component parts hit your quantity proposed, or pretty near

near it, (for any quantity below 12 needs no recollection at all, as in two of the examples foregoing), and then work accordingly; if the quantity be 15 yards I readily know that 3 times 5 is 15; and therefore 3 and 5, or 5 and 3, are to be my multipliers; if the quantity were 21, then 3 and 7, or 7 and 3, would be multipliers: if 30, then 5 and 6, or 6 and 5; also 3 and 10, or 10 and 3; if 45, 48, 56, 66, 72, 96, &c. were the quantities, then 5 and 9, 6 and 8, 7 and 6 and 11, 6 and 12, and 8 and 12, &c. are to be multipliers, and exactly hit the several quantities which they are component parts, and examples of this kind have two multiplications for their solution.

When the quantity proposed is a number irregular or such a number that no two numbers in the table can be found to answer it, then we must multiply by two such numbers as come pretty near it, as is said above; and for the number wanting, to make up the number or quantity proposed, multiply the given price of one by the number that is wanting, which will make three products by three multiplications, which last product must be added to the foregoing products resulting from two multiplications, and the total will be the answer.

And first, I shall shew examples of the second step, viz. of regular quantities that exceed 12, and are precisely answered at two multiplications, such as mentioned above, viz.

What comes 15 yards of muslin to at 3—5
per yard? 3 and 5

Here 3 times 5 is 15 d. or 1 s. 3 d.
3 and carry 1 s. then 3 times 3 is 9, 10—3
and 1 is 10 s. so the first product is 5
10 s. 3 d. which I multiply by 5, say-
ing 5 times 3 is 15 d. or 1 s. 3 d. 2—11—3
3 and carry 1; then 5 times 10 is 50,
and 1 is 51 s. or 2 l. 11 s. So the amount of 15 yards
at 3 s. 5 d. per yard, is 2 l. 11 s. 3 d. And demonstrable thus, viz. If 10 s. 3 d. be the value of three times 3 s. 5 d. then 5 times the value of 10 s. 3 d. must of necessity be 15 times the value of 3 s. 5 d. because 3 times 3 is 15: and its truth may be proved by addition and multiplication, thus: set down 3 s. 5 d. three times

times, in additional order, and put the three lines together, and the total of them multiply by 5, as before, and the answer will be the same. Or set down 17 s. d. (the product of 2 s. 5. multiplied by 5) three times also, and add them together, and the total will be exactly the same with the result by multiplication: as in the following specimens of work.

| (1) | | (2) | | | |
|-----|----|-----|----|----|------|
| s. | d. | s. | d. | s. | d. |
| 3 | 5 | 3 | 5 | 17 | 1 |
| 3 | 5 | 5 | | 17 | 1 |
| 3 | 5 | — | — | 17 | 1 |
| — | — | 17 | 1 | — | — |
| 10 | 3 | — | — | 2 | 11—3 |
| 5 | | | | | |

2—11—3

Here the first of these two proofs is worked by addition and multiplication, and the second by multiplication (as per margin) and addition. Also,

By this we see, that in all examples under this head, we are to pitch upon two numbers (for multipliers) in the table; which multiplied together, make the quantity proposed; and then we are to multiply the price by one of the numbers, (it matters not by which first), and then that product is to be multiplied by the other number, and the second or last product will be the answer.

Example 2.

Again, what is the value of 21 gallons of brandy,

| s. | d. | | |
|----|-------|-------------|--|
| 7 | 9 | per gallon? | |
| 7 | and 3 | | |
| — | — | | |
| 2 | 14—3 | | |
| — | 3 | | |
| 8 | 0:—9 | | |
| — | — | | |

In this example I say 7 times 9 is 63 d. or 5 s. 3 d. I set down 3 and carry 5; then 7 times 7 is 49, and 5 is 54 s. or 2 l. 14 s. So the first product is 2 l. 14 s. 3 d. which I multiply by 3, and that produces the last product or answer, viz. 8 l. 2 s. 9 d.

Now follow a few more examples of this sort, without any verbal directions, because I think those already given to be sufficient.

I

Example

Example 3.

What comes 30 ells of
Holland to, s. d.
at 3—7 per ell?
10 and 3

1—15—10
3

Ans. 5—07—06

Example 4.

45 pound of raw silk,
at 15—6 per lb.
5 and 9

3—17—6
9

Ans. 34—17—6

Example 5.

56 bushels of wheat,
s. d.
at 4—9
7 and 8

1—13—3
8

Ans. 13—06—00

Example 6.

72 broad pieces,
s. d.
at 23—6 each
12 and 6

14—02—0
6

Ans. 84—12—00

Example 7.

108 lb. of indigo Lahore,
s. d.
at 7—8
9 and 12

3—9—0
12

Ans. 41—8—00

Example 8.

96 C. of currants, at l. s. d.
2—13—6 per C.
8 and 12

21—08—00
12

Ans. 256—16—00

The next gradation of advance is of quantities irregular, or of numbers that are not to be answered precisely at two *multiplications*: in this case, there is no increase of difficulty, but it is as easy as the examples foregoing; only here you will have an addition of one line more, occasioned by bringing down the price of one to be added to the last product; or else a line more made by multiplying the price by what is defective or wanting in the number by two multiplications, to make up the proposed quantity complete; as it may be of 2, 3, 4, 5, &c. as by the subsequent examples may be seen and understood.

Example 1. What is the product of 2 *l.* 13 *s.* 6 *d.* multiplied by 39?

l. 2—13—6
6 and 6

16—01—0
6

96—06—0
8—00—6

104—06—6 *Ans.*

Here I find that 6 multiplied by 6 makes 36; which is within 3 of the quantity proposed; wherefore I multiply by 6, and that product again by the other 6; the last product is 96 *l.* 6 *s.* which is the value of 36; but we want to know the value of 39; wherefore I multiply the

price of one, *viz.* 2 *l.* 13 *s.* 6 *d.* by 3 that is defective or wanting to make up 36 to 39, saying, 3 times 6 is 18 *d.* &c. and find that 3 times 2 *l.* 13 *s.* 6 *d.* is 8 *l.* 00 *s.* 6 *d.* which added to 96 *l.* 6 *s.* 0 *d.* the total gives the complete value of 39; for 36 and 3 make 39. See the work.

Example 2. What comes 79 *C.* wt. of cheese to, at 8 *s.* per *C.* wt.?

l. *s.* *d.*

1—8—0

7 and 11

9—16—0
11

107—16—0
2—16—0

110—12—0 *Ans.*

In this example, I say, 7 times 0 is 0; then 7 times 8 is 56; which is 2 *l.* 16 *s.* set down 16, and carry 2; then 7 times 1 is 7, and 2 carried make 9. So the first product is 9 *l.* 16 *s.* 0 *d.* which multiplied by 11 produces 107 *l.* 16 *s.* 0 *d.* or the value of 77: then for 2 wanting 1 multiply the

1 2

price

price by it, and that gives 2*l*. 16*s*. 0*d*. which added to 107*l*. 16*s*. 0*d*. makes the whole value of 79, viz. 110*l*. 12*s*. 0*d*. as in the work. Or, as there are no pence in the price, you may multiply 28*s*. by 79, without bringing it into pounds, as you work 3.
 it, but omit it till the last, and then cut 28
 off or separate the last figure or cipher of 79
 the product towards the right hand, and —
 halve those towards the left, which half will 152
 be pounds, and the figure cut off shillings, 196
 as in this example, —

221 - 2

l. 110 - 12

The half of two is 1, and the half of 1 is 0, which 1 joined to the two severed from 221, makes 12; so the answer is 110*l*. 12*s*. as before.

Example 3. 112 pounds of sugar, at 5*d*. $\frac{1}{2}$ per lb. to down thus:

s. *d.*

5 $\frac{1}{2}$ per pound.

10 and 10

4—07

10

2—05—10

05—06 the product of 5*d*. $\frac{1}{2}$ by 12 defective.

2—11—04 the answer.

Here, after I have multiplied by 10 and 10, the parts of 100, there wants 12; wherefore I multiplied 5*d*. $\frac{1}{2}$ by 12, and it gives 3*s*. 6*d*. for 12 lb. at 5*d*. $\frac{1}{2}$ which added to 2*l*. 5*s*. 10*d*. the value of 100, makes 2*l*. 11*s*. 4*d*. the due value of 112 lb. at 5*d*. $\frac{1}{2}$ per pound.

Example

Example 4. 94 stone of beef, at 22 d. or 1 s. 10 d. per stone.

1 s. 10 d.
10 and 9

18—04
9
8—05—00
07—04
8—12—04 answer.

Here what is wanting after the two multiplications, is 4; wherefore I multiply 1 s. 10 d. (the price) by 4, which produces 7 s. 4 d. to be added, &c.

Example 5. 97 C $\frac{1}{2}$ of raisins,

l. s. d.
1—05—06 per C.
9 and 10

11—09—06
10
114—15—00
8—18—06
0—12—09 for the $\frac{1}{2}$ C. 124 l. 6 s. 3 d. for the answer.
124—c6—03

After I have multiplied by 9 and 10, I multiply the price 25 s. 6 d. by the quantity wanting, and it produces 8 l. 18 s. 6 d. then for the half C. I take half of the price, which is 12 s. 9 d. and then collect the three lines, the total of which is 124 l. 6 s. 3 d. for the answer.

Note, From the last example may be observed, that there is no need of too much solicitude, concerning coming so very near by two multiplications, for there is wanting to make up the true quantity; nay, if the two multiplications be short by 10 or 12, it is near enough; for it is as easy to multiply the price by 10 or 12, as by 2 or 3, and the addition is the same.

Example 6. Once more; What comes 110 C. $\frac{3}{4}$ hops to, at 4*l.* 10*s.* 6*d.* per C?

| | |
|--|---|
| <p><i>l.</i> <i>s.</i> <i>d.</i></p> <p>4—10—06</p> <p>—————</p> <p>45—05—00</p> <p> 10</p> <p>—————</p> <p>452—10—00</p> <p>45—05—00</p> <p>2—05—03</p> <p>1—02—07$\frac{1}{2}$</p> <p>—————</p> <p>501—02—10$\frac{1}{2}$</p> | <p>After having multiplied by 10 and 10 ply the price 4<i>l.</i> 10<i>s.</i> 6<i>d.</i> by that is wanting, which gives the same with the first product, viz 45<i>l.</i> 5<i>s.</i> 0<i>d.</i> which stands under the product by 100; and for the of a C. I take $\frac{3}{4}$ of the price, viz first the half, and then the half of that half, that is 2<i>l.</i> 5<i>s.</i> 3<i>d.</i> and 1<i>l.</i> 2<i>s.</i> 7<i>d.</i> $\frac{1}{2}$; which four lines added together, make 501<i>l.</i> 2<i>s.</i> 10$\frac{1}{2}$<i>d.</i></p> <p><i>Ans.</i> 10<i>d.</i> $\frac{1}{2}$ for the answer:</p> |
|--|---|

To prove Multiplication,

Whether of simple numbers, or of money; it is most surely done by *division*; but before that is known take this method, viz. As you multiplied the *multiplier* by the *multiplier*, so contrariwise multiply the *multiplier* by the *multiplier*; and if the products are alike, the work is right; or otherwise one of them is wrong, and must be gone over again till they do agree.

Example 1.

365 days in a year.
24 hours in a day.

—————

1460

730

—————

8760

—————

Here (reversely) I say, 5 times 4 is 20, 0 and carry 2; 6 times 4 is 24, and 2 is 26, 6 and carry 2; and 3 times 4 is 12, and 2 is 14. Then 5 times 2 is 10, and carry one; 6 times 2 is 12, and 1 is 13, 3 and carry 1; and three times 2 is 6, and 1 is 7. Which products, added together make 8760, the hours in a year, without taking in the odd 6 hours, which the year doth consist of more than 365 days.

Example

Example 2.

6 gallons of spirits
s. d.
at 3—2 per gall.
7 and 8

1—02—2
8

8—17—4 Ans.

I say here, twice 7 is 14; 2 and carry 1 s. and 3 times 7 is 21, and 1 is 22 s. or 1 l. 2 s. Again, twice 8 is 16 d. 4 and carry 1 s. and twice 8 is 16, and 1 is 17 s. 17 and carry 0; and once 8 is 8 l. Thus both these examples are the same in consequence as if you proceeded in the common and regular method of *multiplication*, and shews the truth of the operation.

The next rule in order, is

D I V I S I O N.


THIS rule, though accounted the hardest lesson in *arithmetic*, yet I shall make it easy and intelligible to the meanest capacity.

The use of this rule is to know how many times one number or sum is contained in another; as if it were asked, how often is 9 contained in 55? the answer is 6 times; or how many times 12 is there in 144? answer 12 times.

As by *multiplication* great names or denominations are brought into small; so contrarily by *division*, small names are brought into greater; as farthings (from one gradation to another) into pounds, pounds weight into tuns weight, and gallons liquid into tuns liquid, &c.

In this rule we are to take particular notice of these three certain terms following, *viz.*

- 1.) The { *Dividend*, or number to be divided.
- 2.) The { *Divisor*, or number by which we divide.
- 3.) The { *Quotient*, or answer to the work; which shows how often the divisor is contained in the dividend.

4. The *remainder*; which is an uncertain branch of this rule, because there is sometimes a remainder, and sometimes not.  And you must particularly note, That the *remainder* is ever of the same name with the *dividend*, and is always less than the *divisor*; for if it be more, or equal to the *divisor*, the work is wrong.

Division is either single or compound; *single*, when the *divisor* consisteth of a single figure, and the *dividend*

dividend of two at most : any of this sort is answered by the multiplication table ; as, if 63 were to be divided by 7, the answer will be 9 times. Here 63 is the dividend, 7 the divisor, and 9 the quotient, or answer.

Compound division is when the dividend hath many, or more figures or ciphers than two, and the divisor one or more figures or ciphers, &c.

Example.

How many times 7 is there contained in 365 ? Or how many weeks in a year ?

| | | |
|--|------------|--|
| | 7) 365 (52 | |
| | 35 | |
| | 15 | |
| | 14 | |
| | — | |
| | (1) | |

A general rule for working

Note { 1. Seek
2. Multiply
3. Subtract
4. Bring down

Having set down the example with two crooked lines, or half parenthesis, one for the divisor, and the other for the quotient, I begin, according to the aforementioned general rule for working, by seeking or asking how often I can take 7 the divisor, out of 36 the two first figures of the dividend, (for I cannot take 7 out of 3, the quotient being never to begin with 0), and the answer is 5 times ; wherefore I place 5 in the quotient, and multiply the divisor 7 by it, (as directed in the general rule), saying, 5 times 7 is 35, which I place under 36 ; and then, thirdly, according to the said rule, I subtract 35 from 36, and there remains 1 ; to which I bring down the next or last figure of the dividend, viz. 5, and then there is 15 for a new dividend or dividuall to work upon ; then I ask or seek again, how oft 7 may be taken in 15 ? and the answer is 2 times ; wherefore I put 2 in the quotient next to the 5 ; by which 2 I also multiply the divisor 7, saying, twice 7 is 14 ; which I set down under 15, and subtract, and there remains 1, which I place between two semicircles thus, (1), as it stands in the work ; where observe, That 365 is the dividend, 7 the divisor, 52 the quotient, or answer, and 1 the remainder : the quotient declares that 7 is contained in 365, 52 times, and 1 over, or remaining ; which I set over the divisor thus $\frac{1}{7}$, and signifies that there is one seventh of a week, or 1 day, more than just 52 weeks in a year,

365 days; which is easily to be found by collating the days of each calendar month as they stand in the almanack.

You may note, That the said $\frac{1}{7}$ is properly what is called a *fraction*, or a piece or segment of the *dividend*; but of this hereafter.

Note also, That if there had been more figures or cyphers in the *dividend*, they must have all been brought down one by one at a time, (and never but one at a time), and (after *subtraction*) set to the remainder: and if there remains 0, you must still bring down but one figure or cypher at a time; and for every figure or 0 so brought down, there must be a figure or 0 placed in the *quotient*, according to the times you can take the *divisor* out of the several *dividuals* you make, by bringing down a figure or cypher at a time out of the *dividend*, till all be brought down, and the work ended.

For a specimen, let us divide 8060 pounds of tobacco equally among 8 men.

8060 (1007 quotient
8...

—

060

56

—

(4)

Here I say the eighths in 8 once, which I put in the quotient; then the eighths in 0, 0 times; which I likewise put in the quotient; then the eighths in 6, 0 times again; which is also placed in

the quotient, and there remains 6; to which I bring down 0, the last of the dividend, and it makes 60; next, the eighths in 60, 7 times, and 7 times 8 is 56, from 60, and there remains 4; so the quotient shews that each person must have 1007 pounds of tobacco for his share in the dividend 8060, and there remains 4 pounds over and above, which makes half a pound more due to each man, because 4 the remainder is half of 8 the divisor; and so the work is done, the quotient given to each man 1007 pounds and an half for his equal share.

Note, That in the operation every time that you bring down a figure or cypher, you are to make a point under it in the dividend, to signify that such a figure or cypher hath been brought down and done with, as may be observed in the foregoing example.

Though this way of working is plain, and easy to be

be understood, yet it is somewhat tedious; and therefore I shall shew a quicker way for dispatch, when the divisor is a single figure; as shall be made conspicuous in these examples following, *viz.*

| I. | II. | III. |
|--------------------|----------|----------|
| 4)78906 | 5)34567 | 6)29702 |
| Quotient 19726 (2) | 6913 (2) | 4950 (2) |
| 4 | 5 | 6 |
| Proof 78906 | 34567 | 29702 |

In the first of these examples I say, the 4's in once, and there remains 3; which considered as placed before 8, the next figure in the dividend, makes 38; then the 4's in 38, 9 times; 9 times 4 is 36, from 38, and there remains 2; which makes 29, the next figure in the dividend, 29; then the 4's in 29, 7 times; 7 times 4 is 28, from 29, and there rests 1; which makes 10, the next of the dividend, 10, and the 4's in 10 twice: twice 4 is 8, from 10, and there remains 2; which makes 26 the last figure of the dividend, 26; lastly, the 4's in 26, 6 times, and 6 times 4 is 24, from 26, and there rests 2, the remainder. And so for the other two examples. And for proof of the work (or of any other example); multiply the quotient by the divisor, and take in the remainder in the first place, or place of units: and if the product be the same with the dividend, the division is right: for say, 4 times 6 is 24, and 2 the remainder, makes 26, 6 and carry 2, &c.

More examples by a single figure.

| | | |
|--------------------|-----------|-----------|
| 3)54321 | 7)279060 | 9)234567 |
| Quotient 18107 (c) | 39865 (5) | 26063 (0) |
| Proof 54321 | 279060 | 234567 |

This is the shortest way of division that can be, by single figure.

As it is as necessary for expedition to divide by 11 and 12, as by a single figure, to have the product in one line; so divide as in these examples, *viz.*

$$11)72646206$$

$$12)76677240$$

$$\text{Quotient } 6604200 (6)$$

$$6389770$$

11

12

$$\text{Proof } 72646206$$

$$76677240$$

$$11)47627000$$

$$12)42007400$$

$$\text{Quotient } 4329727 (3)$$

$$3500616 (8)$$

11

12

$$\text{Proof } 47627000$$

$$42007400$$

In the first of these examples, I say the 11's in 72, answer 6 times, &c. In the second, I say the 12's in 72, answer 6 times, &c. In the third, the 11's in 47, answer 4 times; 4 times 11 is 44, from 47, and there rests 3, &c. In the fourth, I say, the 12's in 42, 3 times; 3 times 12 is 36, from 42, and there remains 6, &c.

By being ready and dexterous in the example above, you may expeditiously divide by these numbers, viz. 10, 120, 1100, or 1200, &c. for it is but cutting off, separating the ciphers from 11 and 12, (when these numbers happen to be divisors), and cutting off and separating the like number of figures or ciphers, from the right hand of the dividend, and then divide the other figures or ciphers towards the left hand, by 11 or 12, as it shall happen; as in the examples following, viz.

Divide 34567 by 110, and 890123 by 120, and 765 by 1100, and 678901 by 1200.

$$11|0) 3456,7$$

$$12|0) 890123$$

$$\text{Quotient } 314\frac{7}{11} \text{ or } \frac{27}{110}$$

$$7417\frac{8}{12} \text{ or } \frac{83}{110}$$

$$11|00) 987,65$$

$$12|00) 6789|01$$

$$89\frac{8}{11} \text{ or } \frac{865}{1100}$$

$$565\frac{9}{12} \text{ or } \frac{901}{1200}$$

When you divide by 10, 100, 1000, or 10,000, &c. you have nothing more to do than to cut off, or to separate so many figures or ciphers of the dividend towards the right hand, as you have ciphers in the divisor,

for, and those figures towards the left, make your quotient; and those cut off towards the right the remainder

Examples.

Divide 123456789 by 10, 100, 1000, 10,000.

By 10 the quotient is 12345678, and the remainder 9.

By 100 the quotient is 1234567, and remainder 89.

By 1000 the quotient is 123456, and remainder 789.

By 10,000 the quotient is 12345, and remainder 6789.

When the divisor consisteth of several figures, there ariseth a little more difficulty in the work; but if the following directions are heedfully attended to, the seeming difficulty is easily overcome; as in the succeeding example, viz.

Suppose I am to divide 78901 pounds among 32 parishes, or suppose an assessment of so much money was laid on so many parishes: what must each parish pay by an equal proportion towards the raising such a supply?

Divisor 32) 78901 (. . . . Quotient.

The example thus set out, I begin at the left hand, seeking how often I can take 32 out of 78; or more easy, how many times 3 there is in 7, and the answer is 2 times; which I place in the quotient thus, 32) 78901 (2, and then according to the *general rule of working*, I multiply the divisor 32 by the 2 placed in the quotient, saying, twice 2 is 4, and twice 3 is 6; so there is 64 to be taken out of 78, which should stand thus:

$$\begin{array}{r} 32) 78901 \quad (2 \\ \underline{64} \\ 14 \end{array}$$

Then I make a point under 9, the third figure of the dividend, and bring it down to the remainder 14, and then the work appears thus;

$$\begin{array}{r} 32) 78901 \quad (2 \\ \underline{64} \\ 149 \end{array}$$

Then I seek again, asking how many times 32 in 149; which is not readily to be answered; but how many times 3, the first figure of the divisor, is there in 14, the two first figures of the dividend 149, and the answer is four times; wherefore, after placing 4 in the quotient, I multiply (as directed in the *general rule*) the divisor 32, by the said 4, saying, 4 times 2 is 8, placing

under 9 the dividual; then 4 times three is 12, which set down under 14; so there is 128 to be taken out of 249, and then the work appears thus:

32) 78901 (24 And after subtraction there remains 21; then I make a point under 0 in the dividend, and bring it down to the right of the remainder 21, and then there is 210, for a new dividual; then, as the general rule directs, I seek again, saying, how many times 32, the divisor, is there in 210,

$$\begin{array}{r} 64 \cdot \cdot \\ \hline 149 \\ 123 \\ \hline 210 \end{array}$$

the dividual? or easier, how many times 3 in 21?

But observe well, That whenever you have a place more in the dividual than in the divisor, then always seek how oft you can take the first figure of the divisor out of the two first of the dividual, and the answer is 7 times; but it will not bear 7 times, for 7 times 32 is 224, and you cannot take 224 out of 210; or rather, you cannot take 22 out of 21; wherefore try in your mind, before you set down the answer, or figure of the quotient, whether it will go to the number of times, as is most easily suggested; as here the question or demand is readily answered 7 times; and so many times 3 may be taken in 21: but when you come to multiply the whole divisor by the times you place in the quotient, you begin at the right hand, and go towards the left carrying the tens that arise, to the next place, which increases the product so, that sometimes subtraction cannot be made, because the under line is greater than the upper; wherefore first try in your mind as above-said; and since it will not bear 7 times, try if it will go 6 times; saying 6 times 2 is 12, 2 and carry 1, and 6 times 3 is 18, and 1 is 19; and 19 may be taken out of 21; therefore set down 6 in the quotient next to the 4, and multiply the divisor 32 by it, and the work will stand thus:

32) 78901 (246

$$\begin{array}{r} 64 \cdot \cdot \cdot \\ \hline 149 \\ 123 \\ \hline 210 \\ 192 \\ \hline 181 \end{array}$$

Here the divisor 32 multiplied by 6, gives 192 to be taken out of 210, and the remainder is 18; to which, after a point made under it, I bring down the 1, the last figure of the dividend, and then there is 181 for a new dividual; then according to the rule, I seek again, (for you are to note, That the

K

aforsaid

aforesaid general rule of working must be as often repeated, as you bring down a figure or cipher from the dividend, to make a new dividial; and also, that for every figure or cipher brought down, there must likewise be a figure or cipher placed in the quotient), how many times 32 the divisor may be taken out of 181 the dividial; or how many times 3 in 18, and the ready answer is 6 times; but on the trial I find it will not go 6 times; wherefore I try a quotient-figure less by 1, viz. 5 times, and find it will bear it: and setting 5 in the quotient next to the 6, I multiply the divisor 32 by it, and it produces 160; which subtracted from 181, the last remainder is 21, and the quotient or answer is 2465; which shews that 32 is contained in 78901, 2465 times, and 21 over.

$$\begin{array}{r}
 32 \overline{) 78901} \quad (2465 \\
 \underline{64} \\
 149 \\
 \underline{128} \\
 210 \\
 \underline{192} \\
 181 \\
 \underline{160} \\
 21
 \end{array}$$

Again, admit a nobleman hath 30,000 *l. per annum*, what is his daily income?

If you divide 30,000 by 365, (the days in a year), the quotient will be the answer. Set it down for working thus,

$$365 \overline{) 30000}$$

First seek how many times 365 can be taken in 300? (an equal number of places with the divisor), answer 0 times; wherefore I go a place farther to the right hand, in the dividend (for 0 must never begin the quotient, as was said before), and make a point under it, viz. under the last 0 but one, as may be seen in the example: and there being a place more in this dividial than in the divisor, I seek how oft the first figure of the divisor, viz. 3, is contained in the two first figures or places of the dividend, viz. 30; and the answer is ten times; but you are never to take above 9 times at once in any of these examples of division; wherefore try in your mind whether it will bear 9 times before you set it down in the quotient, (as was said before), saying to yourself, or in your mind, 9 times 5 is 45; 5 and go 4; 9 times 6 is 54, and 4 is 58; 8 and go 5; and 9 times 3 is 27, and 5 is 32; now 32 cannot be taken out of 30, wherefore take a figure less by a unit or one, viz. 8 times; and finding it will go 8 times, set down 8 in the quotient.

ent; and then say, 8 times 5 is 40; 0 and carry 4; and 8 times 6 is 48, and 4 is 52; 2 and carry 5; and times 3 is 24, and 5 is 29; and then there is 2920 to be taken from 3000; and after subtraction, the work will appear thus:

$$\begin{array}{r} 365)30000(82 \\ 2920 \\ \hline 80 \end{array}$$

Then to the remainder 80, I bring down 0, the last figure of the dividend, and then there is 800 for a new dividend: then you must try now oft you can take 365 out of the said dividend 800, and the number of places being equal in both divisor and dividend, to wit, ask how oft 3 in 8: answer twice; so put 2 in the quotient, and say, twice 5 is 10; 0 and carry 1; and twice 6 is 12, and 1 is 13; 3 and carry 1; and twice 3 is 6, and 1 is 7; so there is 730, to be deducted from 800, and the remainder is 70, as in the work may be seen, viz.

$$\begin{array}{r} 365)30000(82 \\ 2920 \\ \hline 800 \\ 730 \\ \hline (70) \end{array}$$

Thus it appears that the nobleman hath eighty-two pounds *per diem*, and 70 pounds over; which if multiplied by 20, the shillings in a pound, would produce 1400 shillings; which if divided by the divisor 365, there would come out 3 s. a-day more, and there will be a remainder of 305, which multiplied by 4, the pence in a shilling, produces 1220; which divided still by 365, gives 3 pence a-day more: so that 10,000 l. a-year is l. 82—3—10 a-day.

Once more divide 46242 gallons by 252, the gallons in a tun, thus set down:

$$\begin{array}{r} 252)46242(183 \\ 252 \\ \hline 2104 \\ 2016 \\ \hline 882 \\ 756 \\ \hline (126) \end{array}$$

In this example, after inquiry, I find that it will not go twice, therefore I set down 1 in the quotient, and place 252 under 462 of the dividend, and after subtraction the remainder is 210; to which I bring down 4 from the dividend, and the dividend is 2104; and then seeking again, find it will bear 8 times; which placed in the quotient, and the di-

divisor 252 multiplied by it, the product is 2016 to be subtracted from 2104; which being done, the remainder is 88; to which 2, the last figure of the dividend being brought down, there is 882 for the last dividend and then seeking again, I find it will go 3 times; and the product of the divisor multiplied by 3, is 756 which subtracted from 882, there remains 126 for the remainder: so that by this division I find there are 183 tuns in 46242 gallons and 126 gallons remaining or over and above; which being half of 252, the divisor, the remainder is therefore half a tun more.

When you have a cipher or ciphers in the divisor in the first, second, or third place, &c. separate such cipher or ciphers, with a dash of the pen, from the rest of the divisor, and also cut off as many figures of ciphers from the right of the dividend, as you cut off ciphers from the divisor, and divide the remaining figures towards the left hand by the remaining significant figures of the divisor.

Example.

Divide 42952 square poles of land by 160, the square poles in an acre of land.

16|0) 42952 (268

32

109

96

135

128

(7)

Divide 27|00) 62746|20 (2323 $\frac{25}{27}$ $\frac{2520}{2700}$

54

87

81

64

54

106

81

(25)

Here the cipher is cut off from the divisor, and 2 from the dividend; then I ask how oft 16 in 42; answer twice; then the 16's in 109, answer 6 times, then the 16's in 135, answer 8 times. So there are 268 acres, and 7 remains; that is 268 acres, $\frac{7}{10}$ or $\frac{72}{100}$, or almost half an acre.

In this example, two ciphers are separated from the divisor, and also two places from the dividend, and then 62746 is divided only by 27. See the work.

When

When the divisor is 3, 4, 5, 6, or more figures, there is a sure and easy way of performing the work truly, by making a table of the divisor; which may be done by addition, or by multiplying the divisor by 2, 3, 4, &c. Admit you are to divide 987654321 by 123456.

123456)987654321 (8000 times

987648...

(6321)

1

2

3

4

5

6

7

8

9

123456

246912

370368

493824

617280

740736

864192

987648

1111104

Here having noted the number of figures in the divisor, which here is 6, make a point under the sixth figure or place of the dividend, whereby 87654 becomes the first dividual.

The foregoing table is made by doubling the first line, which makes 246912; this added to the first or uppermost line, gives the 3d line 370368; which also added to the said first line, makes 493824 for the 4th line or product; and so of the rest; still remembering to add the subsequent line or product to the first or uppermost line, till you come to the last line of 9 times, which is 1111104; the truth of which may be proved by multiplying the first or uppermost line by 2, 3, 4, 5, &c. and if you commit an error by addition, it may be found or corrected by multiplication.

The use of the said table.

When you have pointed out your number of places in the dividend, cast your eye on the table, and at the first view you may know how many times you can take, as in this example, 7 times is too little, and 9 times too much; wherefore I set down 8 in the quotient, and place 987648, the tabular number which stands against 8 under the dividual, then I subtract

K 3

that

that number from the dividend, and the remainder is 6; to which I bring down 3, and put 0 in the quotient; then to the 63, I bring down 2, and place 0 in the quotient; then to 632 I bring down 1, the last figure of the dividend; but still it will not bear any times or time, wherefore I put another 0 in the quotient; and so the work is done, and the quotient is 8000, and remainder 6321; as in the work.

Thus having plainly, fully, and pertinently shown, by verbal directions, the method of working division; I think it unnecessary to give any more examples in that manner, but shall leave some few examples for practice sake, whose quotients and remainders are expressed, but the operation omitted, to save room, and for trial of the ingenuity of practitioners.

7400690042 divided by 987, the quotient is 7498166, and remainder 200.

479679002742 divided by 4689, the quot. is 102298784, and the remainder 4566.

7969767002 divided by 975294, the quotient is 8162, and remainder is 279080.

456789012345 divided by 9876543, the quotient is 46249, and remainder 8775138.

754697 by 4500, quotes 169, and remainder 4197. And 3692320000 by 345000, quotes 23456, and remains (0).

The proof of multiplication and division.

THese two rules reciprocally prove each other. for, in proving *multiplication*, if you divide the product by the multiplier, the quotient will be the multiplicand; or if by the multiplicand, the quotient will be the same with the multiplier.

Ex. 1.

$$\begin{array}{r}
 345 \\
 24 \\
 \hline
 1380 \\
 690 \\
 \hline
 24)8280(345 \\
 \underline{7200} \\
 1080 \\
 \underline{960} \\
 120 \\
 \underline{120} \\
 (0)
 \end{array}$$

Ex. 2. Or thus,

$$\begin{array}{r}
 345)8280(24 \\
 \underline{6900} \\
 1380 \\
 \underline{1380} \\
 (0)
 \end{array}$$

To prove Division.

Division may be proved by division thus.

If you divide the dividend by the quotient, the quotient will be your former divisor.

Example.

Divide 8280 by 345.

$$345 \overline{) 8280} (24$$

Here the working again is needless, it being in the page foregoing; shews the truth of the assertion, that division may be proved by division, as aforesaid.

But the most usual way of proving division is by multiplication, in this manner, viz. multiply the quotient by the divisor, and the product will be equal to the dividend. See the example in the foregoing page.

345 Quotient.

24 Divisor.

8280

90

8280 Proof.

Note, That when there is any remainder, such remainder must be taken in, or added to the product.

As in multiplication I gave some examples of its utility in money, so likewise I shall give a few examples in division of money, whereby may be seen how expeditiously some things may be done, without having recourse to reduction, the rule of three, &c. viz.

Example 1.

Divide 26 l. 12 s. 6 d. equally among five men. For disposition of working, set it down as follows:

$$\begin{array}{r} \text{l.} \quad \text{s.} \quad \text{d.} \\ 5 \overline{) 26 \text{ } -12 \text{ } -6} \end{array}$$

$$\begin{array}{r} 5 \text{ } -06 \text{ } -6 \\ \hline \end{array}$$

5

$$\text{Proof } 26 \text{ } -12 \text{ } -6$$

In the working of this, I say, the 5's in 26, 5 times; 5 times 5 is 25 from 26, and there remains 1, that is 1 pound, or 20 shillings; which with the 12 s. in the place of shillings, makes 32 s.; then the 5's in 32, 6 times; 6 times 5 is 30, from 32, and there remains 2 s. or 24 d. which with 6 d. in the place of pence, makes 30; then the 5's in 30, 6 times; and so the work is done, and the answer is, that each man must

must have $l. 5-06-6$ for his equal share in the said division of $l. 26-12-6$ amongst five persons: and the truth of it is proved by multiplication of money, sufficiently shewn in the rule of multiplication; as here 5 times 6 is 30, 6 and carry 2; and 5 times 6 is 30 and 2 is 32, 12 and carry 1; and 5 times 5 is 25, and 1 is 26, &c.

Example 2.

Divide the charges of a country feast, amounting to $l. 246-13-4$ equally amongst 12 stewards, to know what each steward must pay.

l. s. d. Here I say, the 12's in 24 twice, 12) $246-13-4$ and 12's in 6, 6 times, and there remains 6 *l.* or 120 *s.* and 13 *s.* makes *Ans.* $20-11-1\frac{4}{12}$ 133; and then the 12's in 133, 11, and there remains 1 *s.* or 12 *d.* then 12 and 4 is 16, and the 12's in 16 once, and 4 remains; so that each steward must pay $l. 20-11-1\frac{4}{12}$ or four twelfths of a penny, something more than a farthing; and this may be proved as that above.

When any quantity is such a number, that any two digits of the *multiplication-table* multiplied together make the said quantity or number, then the quotient may be very expeditiously found at two divisions, and sooner than at one. *Example:* Divide 7872 by 32. In this example, the component parts, which multiplied together make the divisor 32, are 4 and 8, or 8 and 4; for it matters not which of them you divide by first; for either way will give a true and the same quotient; as may be seen by the different methods of the following work.

$$\begin{array}{r} 4) \ 7872 \\ \hline 8) \ 1968 \\ \hline \end{array}$$

$$\begin{array}{r} 8) \ 1968 \\ \hline \end{array}$$

246 Quotient.

$$\text{Or thus, } 8) \ 7872$$

$$\begin{array}{r} 4) \ 984 \\ \hline \end{array}$$

246 Quotient.

Here though the operations are divers, yet the *quotients* are one and the same. Again, divide 44184 by 56.

Example

Example 2.

$$\begin{array}{r} 7) 44184 \\ \hline \end{array}$$

$$\begin{array}{r} 8) 6312 \\ \hline \end{array}$$

789 Quotient.

Here the *divisors* are 7 and 8, or 8 and 7; for either or both will give the same *quotient*.

And thus may above forty examples be wrought by numbers out of the *multiplication-table*, with great dispatch and expedition, as by 15, 18, 25, 35, 64, 72, 96, &c.

When it happens that there is any remainder in the first division, or the last, or both; to know the true remainder, as if you divided by the common way, take this method, *viz.* multiply the first divisor by the last remainder, and take in or add the first remainder, if there be any, and the product will be the true or same remainder, as if you divided by the long way.

Example: Divide 4567 by 15.

$$8) 4567$$

$$5) 1522-1$$

$$304-2$$

Here I multiply 3, the first divisor, by 2, the last remainder, and take in 1, the first remainder, and it makes 7 for the true remainder, as may be proved at leisure by the other way.

(7)

The same method may be taken with respect to component parts in division of money, as in division of simple numbers.

Example.

$$3) \text{ l. s. d.}$$

Divide 463—18—06 into 18 equal parts.

$$6) 154-12-10$$

Answer 25—15—05 $\frac{4}{3}$

By this method of *division of money*, (if the quantity be as aforesaid made by even component parts), you may, by having the price of several things, know the price or value of one thing, at the said rate as well

as by the rule of three : so doth multiplication of money answer questions in the rule of three, when the first number is a unit or one.

Example by division.

If 84 lb. of coffee cost 31-10-0 what costs 1 lb.?

7) 1. $\frac{1}{2}$ s. d.

12) 4-10-0

Answer 0-07-6 a pound.

As in the multiplication of money, to have an answer, you multiply the price by the quantity ; so in division of money, you divide the price by the quantity, to have your answer.

I could speak more largely, if I had room, of the excellent uses that may be made of multiplication and division only ; but their various uses will be better understood by their application in the following rules of arithmetic, particularly in the next rule, called,

R E D U C T I O N.

WHich is an application of multiplication and division, shewing how to reduce numbers of one denomination to another, thereby discovering the same value, though in different terms.

1. As first, all great names are brought into smaller by multiplication, as pounds into shillings, pence, or farthings, by multiplying by 20, 12, and 4. Or hundreds weight into pounds weight, by multiplying by 4, and by 28, or by 112 ; or lower into ounces or drachms, by multiplying by 16 and 16.

2. And on the contrary, all small names are brought into greater by division, ; as farthings into pounds, by dividing by 4, 12, and 20 ; and pounds weight into hundreds weight, by dividing by 28 and 4 ; the drachms into pounds, by dividing by 16 and 16.

But you may note, That pounds are brought into pence, by multiplying by 240 ; or into farthings, by multiplying by 960 ; and just the contrary by division.

The

The sense, meaning, and use of reduction, is expressed in the following verses.

Reduction shews how we of names in use,
May great to small, and small to great reduce;
So that the answer which shall thence arise,
The given sum in value equalize:
Multiply, or divide it, back you must,
Which makes again your given number just.

Example 1.

In 240 l. Sterl. how many pence ?

20 Shillings 1 pound.

Or thus.

240 l.

4800 Shillings in 240 l.

240 d. in 1 l.

12 Pence 1 shilling

9600

Ans. 57600 Pence in 240 l.

480

Ans. 57600

Example 2.

In 226 tuns of copper how many pounds weight ?

20 C. 1 tun.

Or thus.

4520 Hund. wt. in 226 tuns.

226 Tuns.

4 qrs. 1 C.

20

18080 qrs. of a C. wt. in 226 tuns.

4520

28 lb. 1 qr. of a C.

112

144640

54240

36160

4520

506240 Pounds wt. in 226 tuns.

506240 Pounds.

These foregoing examples are great names to be brought into small, (as may easily be observed and understood); therefore, as the first rule directeth, it is done by multiplication, by multiplying the greater name by the number of the next lesser name, that makes one of the said greater; as in the last examples the lesser name to pounds is shillings; wherefore

I multiply by 20, because 20 of that lesser name make one of the said greater name, *i. e.* 20 shillings make a pound. And the same regard is had, and method observed, in the example of weight; as is very plain to be seen in the work, and is called *reduction descending*, because it brings higher or greater denomination into lower or lesser.

4)

Example 3.

Bring 494400 Farthings into pounds.

Or thus.

13) 123600 Pence96,0) 494400 (5151.
480..20) 10360 Shillings.515 Pounds.

— In this way
144 divide by 96
96 the farthing
— in a pound
480 &c.
480
—
(0) //

In the first way I divide the farthings by 4, because 4 of them make a penny, and the quotient is pence; then these pence I divide by 12, because 12 of them make a shilling, and that quotient is shillings; which shillings I divide by 20, to bring them into pounds thus: I cut off the cipher in the dividend towards the right, for the cipher that is in the divisor 20 which is also separated from 2 with a dash of the pen, (as may be seen in the work); then I halve the figures one by one, as they are united with the remainder in the dividend; which half is pounds, and is a short way of dividing by 20: in the example, I say, the half of 49 (because I must not set down 0 at the beginning) is 24, and the half of three is 1, and there remains 1; which makes the next, which is 0, 10; and the half of 10 is 5: so that 10360 shillings make 515 pounds, or there are so many pounds in 494400 farthings.

Note, In dividing by 20, as above, if any thing remains, it must be joined or annexed to the figure or cipher cut off; as suppose there had in halving the last figure (excepting what you cut off) remained 1; then that one must have been joined to the cipher separated

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multiply the pounds by 20, if there be any shillings in the denomination or place of shillings, you must take them in; so likewise when you multiply the shillings by 12, if there be any pence in the place of pence, you must also take them in: and so when you multiply the pence by 4, to bring them into farthings, you must take in the farthings, if there be any, in the place of farthings, as in the following work.

Example 5.

l. s. d.

In 346—16—9½ how many farthings?
20 Shillings 1 pound.

6936 Shillings in 346 *l.* 16 *s.*
12 Pence 1 shilling.

83241 Pence in 346 *l.* 16 *s.* 9 *d.*
4 Farthings 1 penny.

332966 Farthings in 346 *l.* 16 *s.* 9½ *d.*

The example is so plain in the work, that it hardly needs any explication; but I begin to say 0 is 0, but 6 in the units of shillings is 6; then twice 6 is 12, and 1 in the tens of shillings is 13, 3 and carry 1; and twice 4 is 8, and 1 is 9; and twice 3 is 6; then by 12, saying, 12 times 6 is 72, and 9 *d.* (in the place of pence) is 81, 1 and carry 8; and 12 times 3 is 36, and 8 is 44, 4 and carry 4; and 12 times 9 is 108, and 4 is 112, 2 and carry 11; and 12 times 6 is 72, and 11 is 83, &c.

Example 6.

C. qrs. lb.

56—2—16 of tobacco, how many pounds wt.?
4 qrs. 1 C.

226 qrs. in 56 C. 2 qrs.
28 lb. 1 qr. of a C.

1814
453

Ans. 6344 Pounds wt. in 56 C. 2 qrs. 16 lb.

In the foregoing work, I first multiply the 56 C. by 2, and take in 2 quarters; and then I multiply the 26 qrs. by 28, saying, 8 times 6 is 48, and 6 (the unit-figure in the odd pounds) is 54, 4 and carry 5, &c. Then I multiply by 2, saying, twice 6 is 12, and 1 (that stands in the place of tens in the odd pounds) is 13, 3 and carry 1, &c. Then adding the two products together, they make 6344 pounds, contained in 56 C. 2 qrs. 16 lb. as in the work is conspicuous. Or, the example may be sooner done, by multiplying the 56 C. by 112, the pounds in a C. wt. and taking in the odd weight, viz. 2 qrs. 16 lb. or 72 pounds at once.

| | |
|---------------|---|
| C. | I say here, 12 times 6 is 72; 2 and |
| 56 | carry 7; and 12 times 5 is 60, and 7 |
| 112 | is 67; and then once 6 is 6, setting it |
| <u>672</u> | down in the third place, because by |
| 56,72 odd wt. | multiplying by 12 at once two places |
| <u>6344</u> | are taken up. See the work. |

Or, still briefer thus, by setting down 56 C. the 56 C. four several times, as on the 56 margin, taking in the odd weight, as before; which makes the same as above, 56,72 viz. 6344 pounds; 6344

Reduction ascending,

Is the bringing numbers from a lesser denomination to a greater, and is the reverse of *reduction descending*; and each may serve as a proof to the other, one being performed by *multiplication*, and the other by *division*.

And note, That when at any time *reduction descending* you take in, or add to, the odd money, weight, or measure, as you multiply the several denominations, such quantities will be remainders in *reduction ascending*.

Example by the two foregoing sums.

- 4) In 332966 farthings, how many pounds?
- 12) 83241 — $\frac{1}{2}d.$ remains what taken in.
- 20) 69316 — 9 d. remains what taken in.
- 346 — 16 s. remains what taken in.

So that in 332966 farthings there are 346 l. 16 s. 9 $\frac{1}{2}d.$ and is a sure proof of the foregoing work descending.

Again, in 6344 pounds weight, how many hundred wt. l

$$\begin{array}{r} 28) 6344 \quad (226 \text{ qrs.} \\ 56 \dots \end{array}$$

$$\begin{array}{r} 74 \\ 56 \end{array} \quad 56 \text{ C. 2 qrs. taken in.}$$

$$\begin{array}{r} 184 \\ 168 \end{array}$$

(16) remains pounds taken in.

So that in 6344 pounds weight there is 56 C. 2 qrs. 16 lb. and proves the foregoing example *descending* to be right.

Now follow promiscuous examples of both kinds of reduction, one proving the other.

In 276 l. 12 s. how many pence ?

$$\begin{array}{r} 20 \\ \hline 5532 \\ 12 \end{array}$$

In 66384 d. how many pounds ?

$$\begin{array}{r} 20) 5532 \end{array}$$

Ans. 66384 d. *Ans.* l. 276—12 and proof.

In 47964 grains, how many pounds Troy ?

$$\begin{array}{r} 20) \\ 24) 47964 \quad (1998 \end{array}$$

$$24 \dots 12) 99 \text{—} 18 \text{ pwt.}$$

$$\begin{array}{r} 239 \\ 216 \end{array}$$

In 8 lb. 3 oz. 18 pw. 12 gr. how many grains ?

$$\begin{array}{r} 236 \\ 216 \end{array}$$

$$\begin{array}{r} 99 \\ 20 \end{array}$$

$$\begin{array}{r} 204 \\ 192 \end{array}$$

$$\begin{array}{r} 1998 \\ 24 \end{array}$$

Grains—(12)

$$\begin{array}{r} 7994 \\ 3997 \end{array}$$

Answer 47964 and proof.

In 34 C. 3 qrs. of cotton-wool, how many pounds?

$$\begin{array}{r}
 34 \\
 34 \\
 3484 \\
 \hline
 3892
 \end{array}
 \qquad
 \begin{array}{r}
 112) 3892 \text{ (34 C. } \frac{1}{2} \text{ proof.} \\
 336 \cdot \\
 \hline
 532 \\
 448 \\
 \hline
 \end{array}$$

(84) lb. or $\frac{1}{2}$ of a C.

In 456 C. 3 qrs. 27 lb. of copper, how many pounds?
And what comes it to at 21 d. per lb.?

$$\begin{array}{r}
 456 \text{ C.} \\
 456 \\
 456 \\
 456 \\
 \hline
 111
 \end{array}
 \qquad
 \begin{array}{r}
 \text{Or thus.} \\
 456 \text{ C.} \\
 112 \\
 \hline
 5472 \\
 456 \\
 \hline
 111
 \end{array}$$

51183 pounds.
21 d. per lb.

51183 pounds.

1074843 pence; which bring into pounds by division,
or reduction ascending, as before shewn, and
it will amount 4478 l. 10 s. 3d.

Bring 4796 ells Flemish into ells English. Multiply by 3,
3 and divide by 5, because 3 quarters make
an ell Flemish, and 5 an ell English.

$$\begin{array}{r}
 5) 14388 \\
 \hline
 2877\frac{3}{5}
 \end{array}$$

Reduce 456 ells English into yards. Multiply by 5,
and divide by 4, thus:

$$\begin{array}{r}
 456 \text{ English ells.} \\
 5 \text{ qrs } 1 \text{ English ell.} \\
 \hline
 \text{In } 570 \text{ yds. how many Eng. ells?} \\
 4 \text{ qrs. yard.} \\
 4) 2280 \text{ qrs.} \\
 \hline
 \text{Yds. } 570 \text{ Ans. } 5) 2280 \\
 \hline
 \text{Eng. ells } 456 \text{ Ans. and proof.} \\
 \text{L } 3
 \end{array}$$

Bring

The Young Man's Best Companion.

Bring 130 tuns of wine into gallons.

4 Hogheads 1 tun.

Or thus.

520

252 Gall. 1 tun.

63 Gall. 1 hoghead 130 tuns.

1560

7560

3120

252

Ans. 32760

32760 Gallons.

*Lasts. Quarters. Bushels. Pecks.*Reduce 42—3—5—2 into pecks.
10 qrs. 1 last.

423

8 Bushels 1 qr. by 8, and take in 5 bushels
and lastly by 4, and take in

3389

2 pecks.

4 Pecks 1 bushel.

13558 Pecks in 42 lasts, 3 quarters, 5 bushels
2 pecks.

4)

In 13558 pecks how many lasts, &c.?

8)3389-2 Pecks taken in.

10) 42|3-5 Bushels taken in.

Lasts 42-3 *Quarters* taken in.*Ans.* 42 Lasts, 3 quarters, 5 bushels, and 2 pecks*By Reduction also*

Foreign coins or exchanges may be reduced to Sterling money; and, on the contrary, Sterling money to foreign.

Example

Example.

Reduce 246 Venetian ducats de banco into sterling money, the exchange at 52 d. Sterling per ducat, thus ;

$$\begin{array}{r} 246 \\ 52 \\ \hline 492 \\ 1230 \end{array}$$

$$12) 12792$$

$$210) 10616$$

l. 53—6 to be paid in London for the 246 ducats drawn in Venice.

Reduce 53 l. 6 s. Sterl. into ducats, at 52 d. Sterl. per ducat.

$$\begin{array}{r} 20 \\ \hline 1066 \\ 12 \end{array}$$

$$52) 12792 \text{ (246 ducats to be paid in Venice for 53 l. 6 s. drawn in London.}$$

23 &c.

To reduce Flemish money into Sterling money, divide the pence Flemish by the course of exchange, suppose 33 s. 4 d. and the quotient will be the Sterling money ; and what remains multiply by 20, &c.

Example.

In 242 l. 13 s. 4 d. Flemish, how many pounds Sterl. &c. ?

$$\begin{array}{r} 33 \text{ s. } 4 \text{ d. Flemish } 4853 \\ 12 \end{array}$$

$$400 \quad 4100) 582140 (145$$

$$\begin{array}{r} \text{Remains } 240 \\ 20 \end{array}$$

$$4100) 48100 (12$$

Ans. 145 l. 12 s.

By

By the work it appears, that 145 *l.* 12 *s.* Sterling, answers or is equivalent to 242 *l.* 13 *s.* 4 *d.* Flemish at 33 *s.* 4 *d.* Flemish per pound Sterling.

Thus Flemish money may be reduced to Sterling money, though the course of exchange be at any other rate of shillings and pence Flemish: but when at the rate above, *viz.* 33 *s.* 4 *d.* then the answer is sooner found by multiplying by 3, and dividing by 5; for 400 *d.* Flemish is to 240 *d.* Sterling, (each being a pound), as 5 to 3; for if you divide 400 by 5, it quotes 80: so 240 divided by 3, quotes the same.

The foregoing *example* done by the last proposed way.

l. 242—13—4 Flemish.

3

5) 728—00—0

l. 145—12—0

In 426 French crowns, each 54 *d.* $\frac{1}{4}$ Sterling, how many pounds Sterling?

426

54

1704

2130

166 $\frac{3}{4}$ or $\frac{1}{2}$ *d.*

12) 23110 $\frac{1}{2}$

2) 0) 1925 : 10 $\frac{1}{2}$

Ans. *l.* 96 : 5 : 10 *d.* $\frac{1}{2}$

Again, bring 1600 pieces of eight, at 54 *d.* $\frac{1}{4}$ Sterling, into pounds Sterling.

1600

1600

54

6400

8000

400

12)86800 pence

2)0)723|3-4

l. 361 : 13 : 4

Here the 1600 pieces of eight, are multiplied by 54, to bring them into pence; and for the $\frac{1}{4}$ I take the $\frac{1}{4}$ of 1600, &c. as in the work. And the answer is l. 361 : 13 : 4.

This method is of use in reducing the exchanges of Cadiz, Leghorn, and Genoa. Or when the exchange is at so many pence, and eighths of a penny, (as often the exchanges run), then multiply the given number to reduce it into pence, by the pence contained in a piece of eight; and also multiply the said given number part, by the numerator or upper figure of the fraction, and divide by the denominator, or under figure of the fraction, and the quotient will be pence; which add to the other pence produced by multiplying the given number by the pence contained in one of the pieces for exchange; then divide the total pence by 12, &c.

Example.

Bring 296 dollars, at 52 d. $\frac{5}{8}$ Sterling into pounds Sterling.

296

52

592

1480

15392

185

12)15577

2)0) 129|8 : 1

296 Dollars

5

8)1480

185

Ans. l. 64 : 18 : 1 Sterling money due for 296 dollars, at 52 d. $\frac{5}{8}$ Sterling per dollar.

But

But ducats, dollars, crowns, millreas, &c. are more expeditiously cast up by the rules of practice hereafter to be shewn.

And so much for *Reduction*. The next rule in *arithmetic* is

The GOLDEN RULE, or Rule of Three.

IT is called the *Golden Rule* from its excellent performance in *arithmetic*, and in other parts of mathematical learning.

And it is called the *Rule of Three*, because from three numbers given, proposed, or known, we find out a fourth number required, or unknown, which bears such proportion to the third as the second does to the first number. From whence also it is called *The Rule of Proportion*.

And of this *proportion* there are two sorts; one called *Direct*, and the other *Indirect*, or *Reverse*.

Direct proportion is, when the second and third numbers are to be multiplied together, and their product divided by the first.

Indirect, or reverse proportion is, when the first and second numbers are to be multiplied together, and their product divided by the first.

In *direct proportion* the fourth number, or answer to the question, contains the third number as often (or as many times) as the second contains the first.

But in *indirect proportion*, the greater the third number is, the less is the fourth; and the lesser the third number is, the greater is the fourth.

The stating the question.

The chiefest difficulty that occurs in the *rule of three* is the right placing the numbers, or stating the question: for when that is done, you have nothing more to do, but to multiply and divide, and the work is done.

And to this end, we are to remember, that of the three given numbers two of them are always of one name or denomination, and the other number is even of the same name with the fourth number or answer required; and must always be the second or middle number; and the number that asketh the question must still possess the third or last place; and the other number of the same name with the third, must

the first number: for the first and third numbers must always be of one name, viz. both money, both weight, both time, or both measure. And though they be of one kind, yet if one of them is altered by reduction, from a high to a lower name, then the other must be reduced to the same name. For you must particularly note, "That if either the first or third numbers consists of several denominations, that is, of pounds and shillings; or pounds, shillings, and pence; or of pounds, shillings, pence, and farthings; or of shillings, pence, and farthings, &c. then must they be reduced to the lowest name mentioned. And if they happen to be of divers denominations, and the first but of one name; then the number of one name must be reduced as low, or into the same name with the other: as suppose the first number is brought into shillings, then the third number, though but pounds, must be brought into farthings also. Then you are to multiply the second and third numbers together, when the proportion is direct, and divide the product by the first number, and the quotient thence arising will be the answer to the question, and in the same name with the middle number, and if in a small denomination, it must be brought by division to the highest name, for the better understanding the answer." You must also note, "That if the middle number be of several denominations, it must be brought to the lowest mentioned."

Example 1.

If 12 gallons of brandy cost 4*l.* 10*s.* what will 134 gallons cost at that rate?

Stated for working thus:

| Gallons. | <i>l.</i> | <i>s.</i> | Gallons. |
|----------|-----------|-----------|----------------------------|
| If 12 | 4 | 10 | 134 |
| | 20 | | 90 |
| | 90 | | 12)12060 |
| | | | 20)1005 |
| | | | <i>l.</i> 50 5 <i>Ans.</i> |

Here the first and third numbers are of like names, both gallons: and 134 being the number that is asked the question, it hath the third place, as it always must, as before asserted; and 4*l.* 10*s.* the second number, being of two denominations, viz. pounds and shillings, it is reduced into the lowest mentioned,

mentioned, viz. shillings as before directed, and the three numbers are these, viz. 12—90—134; and 134 the third number, being multiplied by 90, the second number, produces 12060; which divided by 12, the first number, quotes 1005, which are shillings because 90, the middle number, were shillings: and 1005 shillings, divided by 20 gives 50*l.* 5*s.* for the answer: and for the proof of its truth, state it back again thus:

Example 2.

Gal. *l.* *s.* Gal.

If 134 cost 50—5 what 12?

$$\begin{array}{r}
 20 \\
 \hline
 1005 \\
 12 \\
 \hline
 134) 12060 \\
 \underline{1206} \\
 \hline
 \end{array}$$

(90*s.* *Ans.* or 4*l.* 10*s.* the cost of 12 gallons, and is a sure proof of the first work; and the back stating

and working the proof is as much a question in the rule of three as the first.

By the foregoing rules and directions, and the two operations, you may understand the nature of the rule, and method of working, and with ease and certainty answer any example proposed in the rule of three direct: and therefore I shall omit what I can of verbal directions, and abate as much of figure-work as is consistent with dispatch, and of not leaving the work too obscure; to save room, and not to be too prolix; and to this end, I shall only give the examples stated, and a little of the work, and the answers to the questions, leaving most of the operations to be performed by the ingenious practitioners.

Example 3.

If 56 *lb.* of indigo cost 11 *l.* 4*s.* what will 1008 *lb.* cost at that rate?

lb. *s.* *lb.*

If 56—224—1008? *Ans.* 4032*s.* or 201*l.* 12*s.*

Example 4.

If half a C. wt. of copper cost 4 *l.* 18*s.* what quantity will 14*s.* buy at that rate?

s. *lb.* *s.*

If 98 buy 56, what 14? *Ans.* 8 *lb.* of copper.

Example 5.

If 4 C. 3 qrs. of sugar cost 5 *l.* 15*s.* 7*d.* what will 10 hhds. come to, weighing 42 C. 1 qr. 14 *lb.*?

lb. d. lb.
 If 532—1387—4746? *Ans.* 12373 pence, or 51 *l.*
 11 *s.* 1 *d.* And the remainder 266, multiplied by 4,
 gives 1064; which also divided by the first number
 532, gives a halfpenny more; so the whole is 51 *l.*
 11 *s.* 1 $\frac{1}{2}$ *d.*

Any of these examples, or any other, may be pro-
 ved by a back-stating, according as the first example
 was proved; and each proof becomes another question
 in the rule of three, as we said before

Example 6.

If I have 50 *l.* a-year salary, how much is due to
 me for 144 days service at that rate?

Days l. Days

If 365—50—144? *Ans.* *l.* 19—14—6 $\frac{20}{365}$ parts of a
 penny.

In this example, the product of the third by the
 second number is 7200, which divided by the first
 365, (according to the rule), quotes 19 pounds, the
 name of the middle number, and there is a remain-
 der of 265; which multiplied by 20, according to re-
 duction, and the product still divided by 365, there
 comes out 14 shillings, and yet there is a remainder of
 190, which multiplied by 12, and the product divided
 by 365, gives 6 *d.* and there is a remainder of 90;
 which if multiplied by 4, (the last inferior name),
 and divided by 365, yet would not come to a farthing
 more; so that the answer is above, *l.* 19—14—6 $\frac{20}{365}$

You are to note always, That when any thing remains
 that is reducible to an inferior or lower name, after multipli-
 ed as above, it must continually be divided by the first number.

Note also, When the first of the three given numbers is
 an unit, or one, the work is performed, or answer found, by
 multiplication.

Example 7.

If I am to give 17 *s.* for 1 *lb.* of Belladine silk, what
 must I give for 264 *lb.* at that rate?

| | | |
|------------|-----------|------------|
| <i>lb.</i> | <i>s.</i> | <i>lb.</i> |
| If 1 | 17 | 264 |
| | | 17 |

Ans. 4488 or 224 *l.* 8 *s.*

M

Example.

Example 8.

If I buy 49 bags of hops, at 12 *l.* 12 *s.* 6 *d.* per bag, what come they to at that rate?

| | | | | |
|------|-----------|-----------|-----------|-------|
| Bag. | <i>l.</i> | <i>s.</i> | <i>d.</i> | Bags. |
| 1— | 12 | 12 | 6 | 49 |

7 and by 7

88—07—6
7

618—12—6

The foregoing work is performed by the component parts, as taught in *multiplication*.

When the third or last of the three given numbers is an unit or one, then the work is performed by *division*.

Example 9.

If 12 ells of holland cost 3 *l.* 6 *s.* what is the price of 1 ell at that rate?

| | | |
|--------|---------------|------|
| Ells. | 12) <i>s.</i> | Ell. |
| If 12— | 66— | 1 |

Ans. 5 *s.* 6 *d.*

5 $\frac{6}{12}$ or 5 *s.* 6 *d.*

Example 10.

If 56 yards of broad cloth cost 40 *l.* 12 *s.* what come a yard to at that rate?

| | | | |
|--------|--------------|-----------|-----|
| Yds. | 7) <i>l.</i> | <i>s.</i> | Yd. |
| If 56— | 40 | 12 | 1 |

Ans. 14 *s.* 6 *d.* per yd.

8)5—16

0—14 6 *d.* Answer.

This example is wrought by *division of money*, and by component parts; as before taught in the rule *division*.

Example 11.

If *A* owes *B* 296 *l.* 17 *s.* and compounds at 7 *s.* 6 in the pound; what must *B* take for his debt?

| | | |
|-----------|-----------|-----------|
| <i>s.</i> | <i>d.</i> | <i>s.</i> |
| If 20— | 90— | 5937 |

Ans. *l.* 111—6—4 $\frac{1}{2}$.

Exam

Example 12.

If a gentleman hath an estate of 500 *l.* a-year, what may he expend daily, and yet lay up 12 *l.* 15 *s.* per month?

First multiply 12 *l.* 15 *s.* by 12, the months in a year, and it makes 153 *l.* which deducted from 500 *l.* the remainder is 347 *l.* Then say,

Days. *l.*

If 365 ————— 347, what 1 day? *Ans.* 19 *s.*

After you have reduced the pounds into shillings, which make 6940, you divide them by 365, and the quotient is 19 *s.* per day.

The Rule of Three Reverse, or of Indirect proportion.

What *indirect proportion* is, has been hinted already.

In *direct proportion*, the product of the first and fourth numbers is equal to the product of the second and third.

But in this *proportion*, the product of the third and fourth numbers, is equal to the product of the first and second.

The method of stating any question in this rule, is the same with that of the *direct rule*.

For the first and third numbers must be of one name, or so reduced as in that rule; and the number that moves the question must possess the third place; and the middle number will be of the same name with the answer, as it is there.

To know when the question belongs to the *direct*, and when to the *reverse rule*.

When the question is stated as above said, consider whether the answer to the question ought to be more or less than the second number; if more, then the lesser of the first and third numbers must be your *divisor*.

But if less, then the greater of the two extreme numbers must be your *divisor*.

And if the first number of the three is your *divisor*, then the *proportion* is *direct*; but if the last of the three is your *divisor*, the *proportion* is *indirect* or *reverse*.

Or without regard either to *direct* or *reverse*:

If more is required, the lesser } is the divisor.
If less, the greater }

Examples for explanation.

Example 1.

If 4 men plane 250 deal boards in 6 days; how many men will plane them in 2 days?

If 6 days require 4 men, what 2 days? *Ans.* 12 men.

6

2) 24

12 *Answer.*

Example 2.

If a board be 9 inches broad, how much in length will make a square foot?

In B.

In L.

If 12 ——— 12 what 9 inches broad?

12

9) 144

Answer 16 inches length.

In these examples, the first and second numbers are multiplied together, and their product is divided by the third; for, in the first example, it is most certain, that two days will require more hands to perform the work than 6 days; therefore the lesser of the extreme numbers is the *divisor*; and declares the question is in the *indirect proportion*.

Likewise in the second example, 9 inches in breadth must needs require more in length to make a foot, than 12 inches in breadth; wherefore it is in the *same proportion* with the first example, because the *divisor* is the third number.

Example

Example 3.

How many yards of sarcenet, of 3 qrs. wide, will line 9 yards of cloth of 8 qrs. wide.

qrs. wide yds. long. qrs. wide.

If 8 ————— 9 what ————— 3.

8

Here the narrower the silk,
the more in length is required.

3) 12

Yards 24. Answer.

Example 4.

If a quartern loaf weigh 4 lb. $\frac{1}{2}$ when wheat is 5 s. 6 d. the bushel; what must it weigh when wheat is 4 s. the bushel.

d. half lb. d. lb.
If 66 ————— 9 ————— 48 Answer 6 $\frac{3}{10}$.

Example 5.

If in 12 months 100 l. principal gain 5 pounds interest; what principal will gain the same interest in 5 months?

M. l. p. M.
12 ————— 100 ————— 5

12

5) 1200

Answer 240 l. principal.

The Double Rule of Three Direct.

IN this rule there are five numbers given to find out a sixth, which is to be in proportion to the product of the fourth and fifth numbers, as the third number is to the product of the first and second numbers.

Questions in this kind of proportion are wrought either by two operations in the single rule of three direct, or by the rule composed of the five given numbers, and the one may be a proof to the other; as may be seen in the example following.

M 3

Example

Example 1.

If 100 pounds principal in 12 months gain 5 pounds interest; what will 246 pounds principal gain in 7 months?

If 100 gain 5 what 246

$$\begin{array}{r} 5 \\ \hline 100 \quad 12 \quad 30 \\ 20 \end{array}$$

$$\begin{array}{r} 100 \quad 6.00 \text{ Answer } 12 \text{ l. } 6 \text{ s.} \\ M. \quad l. \quad s. \end{array}$$

Then say again, if 12 gain 12—6 what 7?

$$\begin{array}{r} 20 \\ \hline 246 \\ 7 \\ \hline 12 \quad 1722 \\ \hline 20 \quad 1413.6 \\ \hline l. \quad 7.3.6 \end{array}$$

In the first stating, the answer is, that if 100 gain 5 pounds, then 246 l. will gain 12 pounds 6 shillings.

Then I say in the next stating; If 12 months gain 12 l. 6 s. what will 7 months gain? and the answer is l. 7—3—6. And so how much will 246 pounds gain in 7 months, if 100 pounds gain 5 pounds in 12 months?

You must particularly note, That in all operations where the answer to the question is found by two statings of the rule of three, the answer of the first stating is ever the middle number of the second stating; as in the preceding example.

Th

The foregoing question may be answered by a stating, composed of the five given numbers, thus :

| (1) | (2) | (3) | (4) | (5) |
|--------|-----|-----|-------|-----|
| l. | M. | l. | l. | M. |
| If 100 | 12 | 5 | 246 | 7 |
| 12 | | | 7 | |
| <hr/> | | | <hr/> | |
| 1200 | | | 1722 | |
| | | | 5 | |

In this work, the stating the question, the first and fourth numbers are made of one name, and the second and fifth; then the two first numbers are multiplied together for a divisor, and the last three numbers are multiplied together for a dividend, and the quotient or answer is of the same name with the middle number, viz. pounds interest. In the work I find the first quotient 7 pounds interest; and so I proceed from one denomination to another, till I find the same answer, as in the work at two statings, viz. l. 7—3—6.

$$\begin{array}{r} 1200 \overline{) 8610} \quad (7 \text{ l.} \\ \underline{8400} \\ 210 \\ \underline{20} \end{array}$$

$$\begin{array}{r} 1200 \overline{) 4200} \quad (3 \text{ s.} \\ \underline{3600} \\ 600 \\ \underline{12} \end{array}$$

$$\begin{array}{r} 1200 \overline{) 7200} \quad (6 \text{ d.} \\ \underline{7200} \\ (0) \end{array}$$

This method of operation serves to answer all questions in the double rule of three direct.

The Double Rule of Three Reverse.

In this rule you must place your numbers in such order, that your second and fourth numbers may be of one name or denomination, and your third and fifth.

Example.

If 100 l. principal in 12 months gain 6 l. interest, what principal will gain 20 l. interest in 8 months?

Stated

Stated thus :

| <i>l. P.</i> | <i>Mo.</i> | <i>l. Int.</i> | <i>Mo.</i> | <i>l. Int.</i> |
|--------------|------------|----------------|------------|----------------|
| (1) | (2) | (3) | (4) | (5) |
| If 100 | 12 | 6 | 8 | 20 |
| 12 | | | 6 | |
| 1200 | | | | |
| 20 | | | | |

48 the divisor,

48)24000 (500 *l.* principal. *Answer*

240

(0)

In this work, the third and fourth numbers are multiplied together for a divisor; and then the first is multiplied by the second, and that product by the fifth number, and the product 24000 is divided by 48, and the quotient is 500 *l.* principal; which is the answer to the question, as may be seen in the work.

Rules of practice.

These rules are so called from their frequent use and brevity in casting up most sorts of goods or merchandise.

Note, That any question in the rule of three, when the first number in the stating is 1, is no more briefly done by these rules, called practice.

But previous to these rules, it is necessary to have the following tables by heart.

Parts of a shilling. Of a pound.

| <i>d</i> | | |
|---------------------------------|--|----------------|
| 6 is $\frac{1}{2}$ | | $\frac{1}{20}$ |
| 4 is $\frac{2}{3}$ | | $\frac{1}{15}$ |
| 3 is $\frac{3}{4}$ | | $\frac{1}{10}$ |
| 2 is $\frac{4}{5}$ | | $\frac{1}{8}$ |
| $1\frac{1}{2}$ is $\frac{5}{4}$ | | $\frac{1}{6}$ |
| 1 is $\frac{6}{5}$ | | $\frac{1}{5}$ |

Parts of a pound.

| <i>s.</i> | <i>d.</i> | |
|-----------|--------------------|----------------|
| 10 | 0 is $\frac{1}{2}$ | |
| 6 | 8 | $\frac{1}{3}$ |
| 5 | 0 | $\frac{1}{4}$ |
| 4 | 0 | $\frac{1}{5}$ |
| 3 | 4 | $\frac{1}{6}$ |
| 2 | 6 | $\frac{1}{8}$ |
| 2 | 0 | $\frac{1}{10}$ |
| 1 | 8 | $\frac{1}{12}$ |
| 1 | 0 | $\frac{1}{20}$ |

Example

Example 1.

Parts of a shilling.

6d. is $\frac{1}{2}$
of 1 s. |

426 pounds of sugar, at 6 d. per lb.

2|0) 213

l. 10 - 13 Answer.

Here 6 d. being the price of each lb. and the half of a shilling; therefore the half of 426 is taken, and gives 213 s. or 10 l. 13 s.

Example 2.

4d. is $\frac{1}{3}$
of 1 s. |

512 lb. of cheese, at 4 d. per lb.

2|0) 170 - 8 d.

l. 8 - 10 - 8 Answer.

Here 4 d. is $\frac{1}{3}$ of a shilling; therefore the third part of 512 is 170 s. and $\frac{2}{3}$ of a shilling, or 8 d. remains.

Note always, That the remainder is of the same name with the dividend, which here is groats; for the pounds of the cheese are at a groat each.

Example 3.

3 d. is $\frac{1}{4}$
of 1 s. |

246 yards of riband, at 3 d. per yard.

2|0) 61 - 6 d.

l. 3 - 1 - 6 Answer.

Here the yards are divided by 4, because 3 d. is the fourth part of a shilling; and it quotes 61 shillings, and 2 remains, or two 3 pences. So the answer is l. 3 - 1 - 6.

And thus may any proposed question be answered, belonging to the first table, or parts of a shilling, that is, by dividing the given number by the denominator of the fraction, and the quotient will be always shillings, which (the remainders being known as above) bring into pounds, by dividing by 20, &c.

When the price of the integer is at a farthing, a half-penny, or three farthings more than the value of the pence mentioned, then for those farthings take a proper part of the forgoing quotient found for the pence, and add them together.

Examples.

Examples.

249 ells of canvas, at $4\frac{1}{2}$ per ell.

$$\begin{array}{r|l}
 4 \text{ d. is } \frac{1}{4} & 183 \\
 \frac{1}{2} \text{ d. is } \frac{1}{8} & 10\frac{3}{8} \text{ or } 4\frac{1}{2} \text{ Answer.} \\
 \text{of } 4 \text{ d.} & \\
 \hline
 20) 913 - 4\frac{1}{2} & \\
 \hline
 4 - 13 - 4\frac{1}{2} \text{ Answer.} &
 \end{array}$$

In this example I divide by 3 for the groats, as being the third of one shilling, and it quotes 83 s.; then I consider that a halfpenny is the eighth of 4 d. therefore I take the eight part of the groat line, or 83 s. and that produces 10 s. and $\frac{3}{8}$ of a shilling, or $4\frac{1}{2}$; then the two lines being added together, make 93 s. $4\frac{1}{2}$ d. or 4 l. 13 s. $4\frac{1}{2}$ d. as in the work.

Parts of a pound.

10 s. is $\frac{1}{2}$ — 254 yards of cloth, at 10 s. per yard.

l. 127 Answer.

Here the half of 254 is taken, because 10 s. is the half of a pound.

$$\begin{array}{r|l}
 \text{s. d.} & \\
 6 - 8\frac{1}{3} & 972 \text{ gallons, at } 6 \text{ s. } 8 \text{ d. per gallon.} \\
 \hline
 \end{array}$$

l. 324 Answer.

Here the third part is taken, because 6 s. 8 d. is the third of a pound; and the answer is l. 324.

And thus may any question proposed be answered belonging to the second table, or parts of a pound; that is, by dividing the given number by the denominator of the fraction, and the quotient will always be pounds; and if any thing remains, it is always some many halves, thirds, fourths, or fifths, &c. of a pound according to the denominator that you divide by.

If the price be shillings and pence, or shillings, pence and farthings, and no even part of a pound, then multiply the given number by the shillings in the price, and take even parts for the pence, or pence and farthings, and add the several lines together, and they will be shillings; which shillings bring into pounds, as before.

Example.

Examples.

l. s. d.

426 at 4—9

4

Ells. s. d.

216 at 3—3½

2 per ell.

6 d. ½
3 d. ¼

1704

213

106½ or 6 d.

3 d. ¼
½
of 3 d.

432

54

9

210) 20213-6

210) 4915 s.

l. 101-3-6

24-15 Ans.

396 gallons of brandy, at 7s. 9 d.

(per gallon.

7

2772

198

99

6 d. ½ of 1 s.
3 d. ½ of 6 d.

210) 30619

l. 153-9 Answer.

When the price is 10 d. only annex 0 to the right of the given number, (which is multiplying by 10), and they are pence; which divide by 12, and by 20.

Example.

426 l. of hops, at 10 d. per lb.

12) 4260

210) 3515

l. 17-15 Answer.

When the price is 11 d. set down the quantity twice in the form of multiplication, and add the two lines together; then divide by 12, and by 20.

Example.

426 lb. of copper, at 11 d. per lb.

426

12) 4686 Pence.

210) 3910-6

l. 19-10-6 Answer.

If

If the price be $11\frac{1}{2}d.$ take half the uppermost line &c.

Example.

942 lb. of tobacco, at $11\frac{1}{2}$ per lb.

942

471

12) 10833 Pence.

20) 912—9

l. 45—2—9 d. *Answer.*

When the price is 1 s. only, divide by 20.

Example.

20) 964 lb. of tobacco, at 12 d. per lb.

l. 48—4 *Answer.*

When the price is 2 s. it is done at sight, by doubling the last figure towards the right hand, and setting it apart for shillings; and the figures towards the left are pounds.

Example.

596 gallons of spirits, at 2 s. per gallon.

l. 59—12 *Ans.* Here the double of 6 is 12, and the are pounds.

From this method of working by 2 s. a multitude of examples may be most expeditiously wrought, viz.

Ells.

Yards.

| | | |
|----------------------------|--------------------------------------|-----------------------------------|
| | 444 cambrick, at 5 s. 9 d. | 426 at 3 s. 6 d. per yard. |
| | 44—8 at 2 s. | 42—12 at 2 s. |
| | 44—8 at 2 s. 1 s. $\frac{1}{2}$ 2 s. | 21—6 at 1 s. |
| 1 s. $\frac{1}{2}$ of 2 s. | 22—4 at 1 s. 6 d. $\frac{1}{2}$ 1 s. | 10—13 at 6 d. |
| 6 d. $\frac{1}{2}$ of 1 s. | 11—2 at 6 d. | |
| 3 d. $\frac{1}{2}$ of 6 d. | 5—11 at 3 d. | <i>Ans.</i> l. 74—11 at 3 s. 6 d. |

Ans. l. 127—13 at 5 s. 9 d.

The operation of these two examples is so intelligibly wrought, that there is no need of verbal explanation.

Ag

Again, 548 yards of broad cloth, 12 s. 6 d. per yard.

l. 54—16 at 2 s.
6 times 2 s. is 12 s.

d. is | 328—16 at 12 s. Note, That 13 l. 14 s. is
of 2 s. | 13—4 at 6 d. the fourth part of 54 l. 16 s.
the two shilling line.

342—10 Answer.

Or multiply by 12 s. and take half of the given number for the 6 d. thus :

548 yards
12
——
6576
 $\frac{1}{2}$) 274
——
210) 68510

l. 342—10 Answer.

When the price is an even number of shillings, multiply the number of integers by half the price, and double the first figure of the product for shillings, and carry as is usual in multiplication, and the other figures towards the left will be pounds.

Example.

296 yards of cloth, at 14 s. per yard.
7 the half of 16 shillings.

l. 207—4 s. Answer.

Here 7 times 6 is 42 ; the double of 2 s. is 4 s. &c.

When the price is an odd number of shillings, work for the even number as above ; and for the odd shillings take the $\frac{1}{20}$ of the given number, and add them together.

Example.

496 gallons of citron water at 17 s. per gall.
8 the half of 16.

l. 396—16
24—16

l. 421—12 Answer.

N

In

In this example I say, 8 times 6 is 48 ; the double of 8 is 16. and carry 4 ; then 8 times 9 is 72, and 4 is 76 ; 6 and carry 7 ; and 8 times 4 is 32, and 7 is 39 ; then the half of 4 is 2, &c.

I have not here room to speak of the various and almost infinite methods and rules of *practice*, (having several other subjects and things to treat on), but shall leave some general rules, which, if heedfully noted, will be of great use to learners ; and are these, viz.

1. When the price is parts of a farthing, or of a penny, as $\frac{3}{4}$, $\frac{5}{8}$, $\frac{7}{8}$, &c. then multiply the integers by the numerator, and divide by the denominator, and the result will be either farthings, or pence ; which reduce to pounds, &c.

2. When the price is pence, and no even part of a shilling ; as suppose 5 d. 7 d. 8 d. or 9 d. then it may be done by taking their parts, as 3 d. and 2 d. is 5 d. and 4 d. and 3 d. is 7 d. and 4 d. and 4 d. is 8 d. and 6 d. and 3 d. is 9 d. ; but it is an easy and sure way to multiply the given number by 5, 7, 8, or 9, and then the product is pence ; which reduce to pounds by *reduction*.

2. When the price is pence, and parts of a penny as 1 d. $\frac{1}{4}$, 2 d. $\frac{1}{2}$, or 6 d. $\frac{3}{4}$, then work for the penny by taking the $\frac{1}{12}$; for 2 d. the $\frac{1}{6}$; and for 6 d. the $\frac{1}{2}$: then for the farthings take $\frac{1}{4}$ of the penny line, and for $\frac{1}{2}$ $\frac{1}{4}$ of the two penny line : and for $\frac{3}{4}$, take $\frac{1}{8}$ of the penny line, then add their results together, and the total will be shillings, which reduce to pounds by dividing by 20. Or by the sure way of bringing the mixed number into the lowest denomination ; as 1 d. $\frac{1}{4}$ into 5 farthings ; 2 d. $\frac{1}{2}$, into 5 halfpence, and 6 d. $\frac{3}{4}$ into 27 farthings ; then multiply the integers by 5, and the product is farthings ; or by 5 halfpence, and the product will be halfpence ; or by 27 farthings, and the product will be farthings ; which, whether farthings or pence, reduce to pounds, &c.

4. When the price is shillings and pence, or shillings, pence, and farthings, multiply the integers by the shillings of the price, and take parts for the pence or pence and farthings, &c.

5. If the price be pounds and shillings, or pounds, shillings, pence, and farthings, multiply by the shillings, in the price, that is, in the pounds and shillings, and take parts for the pence and farthings.

6. When

6. When the number of integers hath a fraction annexed, or belonging to them; as $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, &c. then take $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ of the price of one of the integers, and add that to the other results.

T A R E and T R E T T, &c.

Gross weight is the weight of the goods in hundreds, quarters, and pounds, with the weight of the hoghead, cask, chest, bag, bale, &c. that contains the goods.

Tare is allowed to the buyer for the weight of the hoghead, cask, chest, bag, bale, &c.

Trett is an allowance made for waste, dust, &c. in sundry sorts of goods, as tobacco, cotton, pepper, spices, &c. and is always 4 lb. per 104 lb. futtle, and found by dividing the futtle pounds by 26, because 4 times 26 make 104 lb. When the gross weight is brought into pounds, and before the tare is deducted, they are called *pounds gross*; and after the tare is subtracted, the remaining pounds are called *pounds futtle*; which divided by 26, (as said before), quotes pounds trett, &c.

Tare at so much per cask, hoghead, bag, &c.

The allowances for tare are variously wrought, as by the following examples.

In 12 casks of indigo, containing 45 C. 1 qr. 14 lb. gross, tare 30 lb. per cask, how many pounds nett?

| 12 Casks. | C. qr. lb. |
|------------------|---------------------------|
| — | 45—1—14 |
| 360 Pounds tare. | 45 |
| | 45 |
| | 45 42 |
| | — |
| | 5082 Pounds gross. |
| | Subtract 360 Pounds tare. |

Ans. 4722 Pounds nett.

In this example the pounds tare of one cask is multiplied by the number of casks, and the product is 360 lb. tare; and the gross weight is reduced into pounds by the method shewn in reduction of weight: and then the pounds tare are deducted from the pounds gross, and the remainder is pounds nett, viz. 4722, as in the work.

When the tare is at so much per C. wt. multiply the number of hundreds by the tare, and take parts

for the odd weight, and add it to the tare found by multiplication, and divide it by 112 to bring it into gross weight, in order for subtraction.

Example.

What is the nett wt. of 12 casks of argol, wt. gross

84 C. 2 qrs. 14 lb.

14 tare per C.

336

84

7 for half C.

$1\frac{3}{4}$ for 14 lb.

C. qrs. lb.

84—2—14

10—2— $8\frac{1}{4}$ Tare.

74—0— $5\frac{1}{4}$ Nett wt.

112) 1184 $\frac{3}{4}$ (10 C.

112

64 lb. or half a C. and 8 lb.

The tare in the last example is to be found by the foregoing directions, 10 C. 2 qrs. $8\frac{3}{4}$ lb. which subtracted, as in the work, leaves 74 C. 0 qrs. $5\frac{1}{4}$ lb. for the nett wt.

But the foregoing example may be sooner done by practice, thus :

C. qrs. lb.

14 lb. is $\frac{1}{8}$ of C. 8) 84—2—14 Gross.

sub. 10—2— $8\frac{3}{4}$ Tare.

74—0— $5\frac{1}{4}$ Nett.

In this method the gross weight is divided by 8, because 14 lb. is one eighth of 112 lb. and there mainder is reduced into the next inferior name, and still divided by eight to the end, and then deducted as above, and the nett weight is the same as by the other way. And so may any tare per cent. be found, if the tare be an even part of 112 lb. as 14 is one eighth and 7 lb. is the half of that, and 16 lb. is one seventh and 8 lb. is the half of that, &c. that is, if the tare be at 7 lb. per C. find it for 14 lb. as before, and then take the half of that for 7 lb. per C. tare, the like for 8 lb. per C. tare, take one seventh for 16 lb. and then the half of that for 8 lb. per C. tare.

Of T R E T T.

What *trett* is, when allowed, and how found, hath been said already; now I shall give an example for explanation, as follows.

Bought six hogsheads of tobacco, containing gross and tare as follows, viz.

| No. | C. | grs. | lb. | lb. |
|-----|-----|------|------|---------|
| 1 | qt. | 4 | 1—20 | Tare 80 |
| 2 | | 5 | 2—19 | 100 |
| 3 | | 6 | 3—18 | 102 |
| 4 | | 7 | 3—12 | 104 |
| 5 | | 8 | 2—13 | 106 |
| 6 | | 9 | 1—14 | 110 |

| | | |
|--------------------------|---|-----|
| Suttle | | |
| 26) 4193 (161 lb. trett. | 42—3—12 | 602 |
| 26 | 42 | |
| | 42 | |
| 159 | 42 96 | |
| 156 | | |
| 38 | 4800 Pounds gross. | |
| 26 | subtract 602 Pounds tare. | |
| 12 | 4198 Poundsuttle. | |
| | deduct 161 $\frac{6}{17}$ Pounds trett. | |
| | 4036 $\frac{7}{17}$ Pounds nett. | |

There are some few other rules, such as barter, or exchanging goods for goods; also exchange for coin, profit, loss, &c.; but all of them being done either by the rule of three, or by rules of practice, it is therefore here unnecessary to enlarge upon them.

Of F R A C T I O N S Vulgar and Decimal.

What *fractions* are, hath already been hinted in the rule of *division*, from whence they arise; for the remainder is a part of the dividend remaining undivided; as admit 54 $\frac{1}{2}$ is divided into twelve equal parts, the quotient is 4, and the remainder 6: so that here 6 remains as yet undivided by 12, and is therefore 6 parts in 12, or six twelfths, equal to a half, for 6 is the $\frac{1}{2}$ of 12; and the remainders are usually set down in this form $\frac{6}{12}$, and when so, the expression

is called a *fraction*, whose parts are understood by these names, *viz.*

$$\begin{array}{r} 6 \text{ Numerator.} \\ \hline 12 \text{ Denominator.} \end{array}$$

The *numerator* is above the short line, and sheweth the number of parts signified by the fraction; and the *denominator* stands under the line, and declares the number of parts into which the integer or whole number is divided, as above 54 *l.* is divided into 12 parts, and the quotient says there are 4 times 12 contained in 54, and 6 remains, which is $\frac{6}{12}$ of a pound, or 10 *s.* as above said.

Fractions are thus set down and read, *viz.* $\frac{1}{4}$, one fourth; $\frac{1}{2}$, one half; $\frac{1}{3}$, one third; $\frac{1}{5}$, one fifth; $\frac{1}{6}$, one sixth; $\frac{2}{3}$, two thirds; $\frac{2}{4}$, two fourths; $\frac{2}{6}$, two sixths; $\frac{5}{7}$, five sevenths, &c.

Fractions are either proper or improper. A proper fraction hath its numerator less than the denominator, as $\frac{5}{8}$, five eighths; $\frac{24}{56}$, twenty-four fifty-sixths, &c.

An improper fraction hath its numerator greater than the denominator, as $\frac{7}{3}$, seven thirds; $\frac{48}{15}$, forty-eight fifteenths, &c.

Again, fractions are either simple or compound. Simple, when part of an integer or thing hath but one numerator, and one denominator; as $\frac{3}{4}$ of a pound Sterling; $\frac{1}{2}$ of a hundred weight; $\frac{2}{3}$ of a tun; $\frac{1}{6}$ of a gallon, &c. Compound is a fraction of a fraction, as the $\frac{1}{2}$ of $\frac{1}{4}$ of a pound Sterling, which is equal to half a crown; or when one is divided into any number of parts, and those parts again subdivided into parts, &c.

Fractions are of two kinds, *viz.* *Vulgar* and *Decimal*. *Vulgar fractions* are as declared before. *Decimal fractions* are artificially expressed, by setting down the numerators only, the denominators being understood and are always an unit, with as many ciphers annexed as there are places in the numerator; and therefore must be either 10, or some power of 10, as 100, 1000, 10,000, or 100,000, &c.

Decimal fractions appear as whole numbers, (and are in the general so wrought), but are distinguished from them by a point or comma prefixed, thus, .5 read five tenths; .32 thirty two hundredths; and .25

two hundred fifty-six thousands : but of decimal fractions and their use hereafter.

Reduction of vulgar fractions is to fit or prepare them, for addition, subtraction, &c.

1. To reduce a mixed number to an improper fraction.

Rule.

Multiply the integer by the denominator, and take in the numerator.

Example.

Reduce 12 gallons $\frac{3}{4}$ to an improper fraction, thus,

4

51 New numerator.

Ans. $\frac{51}{4}$ or 51 quarts.

2. To reduce an improper fraction to a whole or mixed number.

Rule. Divide the numerator by the denominator.

Example.

Reduce the last example to a whole or mixed number,

viz.

51

4) 51

4

12

3 remain. equal to $\frac{3}{4}$.

Here 12 gallons is the whole number, $\frac{3}{4}$ the fraction, the same with three quarts.

3. To reduce fractions to a common denominator.

Rule.

Multiply the numerator of each fraction into all the denominators, except its own, and the product will be a numerator to that fraction ; and then do so by the next, &c.

Example.

Reduce $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{6}$, of any integer, to a common denominator ; say, twice 4 is 8, and 6 times 8 is 48, for a new numerator to $\frac{2}{3}$; then say, 3 times 3 is 9, and 6 times 9 is 54, for a new numerator to $\frac{3}{4}$; lastly, say, 5 times 4 is 20, and three times 20 is 60, the numerator to $\frac{5}{6}$: then to find the common denominator, say, 3 times 4 is 12, and 6 times 12 is 72 the common denominator : so that $\frac{48}{72}$, is equal to $\frac{2}{3}$, $\frac{54}{72}$ to $\frac{3}{4}$, and $\frac{60}{72}$ to $\frac{5}{6}$, which may be thus proved ;

$\frac{2}{3}$ of

| | | | |
|-----------------------------|-------|------------------|--|
| $\frac{2}{3}$ of a pound is | 13 4 | 48 | } 72) 162 ($2\frac{1}{2}$ or $2\frac{1}{2}$ |
| $\frac{1}{4}$ ditto | 15 0 | 54 | |
| $\frac{3}{8}$ ditto | 16 8 | 60 | |
| | <hr/> | <hr/> | 144 |
| | | | 18 |
| 2 l. 5 s. or 45 0 | | $\frac{162}{72}$ | common denominator |

Here the several numerators are added together and they make 162; which placed over the common denominator 72, make the improper fraction $\frac{162}{72}$ and its value is found as before directed, in the rule for reducing an improper fraction to a whole or mixed number as may be seen in the foregoing page.

4. To reduce a fraction into its lowest terms.

Rule.

If they are even numbers, take half of the numerator, and denominator, as long as you can: and then divide them by any digit-number, (*i. e.* 3, 4, 6, &c.) that will leave no remainder in either.

Example.

Reduce $\frac{56}{84}$ into its lowest terms; say, the $\frac{1}{2}$ of 56 is 28, and the $\frac{1}{2}$ of 84 is 42, and then the $\frac{1}{2}$ of 28 is 14, and the $\frac{1}{2}$ of 42 is 21: so the fraction $\frac{56}{84}$ is reduced to $\frac{14}{21}$. And since they cannot be halved any longer for though you can halve 14, yet you cannot 21, without remainder; try therefore to divide them by some other digit-number, and you will find that 7 will divide both numerator and denominator without a remainder; then say the 7's in 14 twice; and the 7's in 21 three times: so is the fraction $\frac{56}{84}$ reduced in its lowest terms, will be $\frac{2}{3}$, two thirds; which is the same value as $\frac{56}{84}$. The work is done in this for

| | | | |
|-------|---|----|--------|
| 2 | 2 | 7 | |
| 56 | | 28 | 14 2 |
| <hr/> | | | |
| 84 | | 42 | 21 3 |

And the proof that $\frac{2}{3}$ is of the same value with $\frac{56}{84}$ will appear by multiplying any integer by the numerator of each fraction, and dividing by the denominator of each fraction.

Exam

Example.

Let the integer be 1 *l.* Sterling, or 20 *s.*

The fraction $\frac{2}{3}$

The fraction $\frac{56}{84}$

$$\begin{array}{r} s. \\ 20 \\ 2 \\ \hline 3) 40 \\ \hline 13-4d. \end{array}$$

$$\begin{array}{r} s. \\ 20 \\ 56 \\ \hline 84) 1120 \quad (13s. \\ 84 \cdot \\ \hline 280 \\ 252 \\ \hline 28 \\ 12 \\ \hline 336 \quad (4d. \\ 336 \\ \hline (0) \end{array}$$

13 *s.* 4 *d.*

Here it is manifest, that by working by a fraction in its lowest terms, much time and figures are saved. In one operation, 20, the integer, is multiplied by 2, and the product 40 divided by 3, and there remains 1, or $\frac{1}{3}$ of a shilling, or a groat, as in the other work.

There are other methods of reducing a fraction into its lowest terms; but none so ready as the foregoing where it can be used.

To reduce a compound fraction into a simple one of the same value.

Rule. Multiply the numerators together for a new numerator, and the denominators together for a new denominator.

Example.

Reduce $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}$ of a pound Sterling into a simple fraction. Say, twice 3 is 6, and 5 times 6 is 30, the numerator; then 3 times 4 is 12, and 6 times 12 is 72, the denominator: so $\frac{30}{72}$ of a *l.* is equivalent to $\frac{5}{12}$ of $\frac{3}{4}$ of $\frac{5}{6}$ of a *l.* Thus proved, $\frac{5}{12}$ of a *l.* is 16 *s.* 8 *d.* and $\frac{3}{4}$ of 16 *s.* 8 *d.* is 12 *s.* 6 *d.* and $\frac{2}{3}$ of 12 *s.* 6 *d.* is 8 *s.* the answer: and multiplying 20 *s.* by 30, and dividing by 72, gives the same answer, as in the following work is plain.

| | | |
|---------------|---|--|
| 20 | } | |
| 30 | | |
| 72) 600 (8 s. | | |
| 576 | | |
| 24 Remains | | |
| 12 Multiply | | |
| 72) 288 (4 d. | | |
| 288 | | |
| (0) | | |
| | | |

6. To find the value of any fraction, whether of coin, weight, or measure.

Rule. Multiply the integer by the numerator, and divide by the denominator; and if any thing remains multiply it by the number of units of the next inferior denomination.

Example.

What is $\frac{3}{7}$ of a pound, or 20 s. ? The operation of the foregoing example of proof to the compound fraction $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}$, answers this question, and need not be repeated.

Again, what is $\frac{5}{6}$ of a tun weight.

C
20 the integer.
5 the numerator.

The denominator 6) 100

C. 16—4 remains.
4 qrs. 1 C.

6) 16

qrs. 2—4 remains.
28 lb. 1 qr.

6) 112

Answer,
16 C. 2 qrs. 18 $\frac{1}{2}$ lb. lb. 18 $\frac{1}{2}$

Here the integer 20 C. is multiplied by the numerator 5, and the product 100 divided by the denominator 6, and the remainder 4 is multiplied by the parts of the next inferior denomination, &c. and the answer is 16 C. 2 qrs. 18 lb. $\frac{4}{6}$, or $\frac{2}{3}$ of a pound weight, as in the work.

Addition of Vulgar Fractions.

IF the fractions to be added have a common denominator, add the numerators together for a numerator, and place it over the common denominator.

Example.

Add $\frac{2}{5}$, $\frac{3}{5}$, and $\frac{4}{5}$ of a pound Sterling together. Say, and 3 is 5, and 4 is 9, the numerator, which place over 5, the common denominator, thus, $\frac{9}{5}$; and this improper fraction $\frac{9}{5}$, is in value 36 s. for 5)9 times 4 s. (the 5th of a pound) is 36 s.; for if the numerator 9 be divided by the denominator 5, I say the 5's in 9 once, and 4 remains, which is $\frac{4}{5}$ of a pound, or 16 s.

But if the fractions to be added have unequal denominators, then they must be reduced to a common denominator, by the rule before shewn, before addition can be made; and then proceed as above.

2. When mixed numbers are to be added, work with the fractional parts as before, and carry the fractional value to the whole numbers.

Example.

Add $25\frac{3}{4}$ to $12\frac{1}{4}$, thus: $25\frac{3}{4}$
 $12\frac{1}{4}$

1. 38 Answer.

Here 1 and 3 the numerators, make 4; and $\frac{3}{4}$ and $\frac{1}{4}$ is 3, and five makes 8; and 1 and 2 is 3, and the answer is 38.

Or they may be reduced to improper fractions, thus:

| | | |
|-----------------|-----------------|-----------|
| $25\frac{3}{4}$ | $12\frac{1}{4}$ | 103 |
| <u>4</u> | <u>4</u> | <u>49</u> |
| 103 | 94 | $4) 152$ |
| <u>4</u> | <u>4</u> | |

38 pounds.

Here the numerators are added, and their total is 49; which divided by 4 the common denominator, makes 12 and $\frac{1}{4}$, and 103 makes 38 pounds, the same answer as above.

3. When

3. When compound fractions are to be added to simple ones, reduce the compound fraction to a simple one, as before directed; and then proceed as above.

Example.

Add $\frac{2}{8}$ and $\frac{3}{8}$ to $\frac{1}{2}$ of $\frac{2}{4}$ of a pound; thus, once 2 is 2, and twice 4 is 8, therefore $\frac{2}{8}$ is equal to the compound fraction; then add, saying, 2 and 3 is 5, and 2 is 7, the new numerator, and $\frac{7}{8}$ equal in value to 17 s. 6 d. will be the answer.

Subtraction of Vulgar Fractions.

IN this rule, the fractions must have a common denominator, or be reduced to one, before deduction can be made.

Example.

What is the difference betwixt $\frac{1}{4}$ and $\frac{3}{4}$? Answer $\frac{2}{4}$; which may be proved by addition: for $\frac{1}{4}$ and $\frac{2}{4}$ makes $\frac{3}{4}$.

Note. The difference between the numerators is the difference of the fractions.

Again, from $\frac{3}{4}$ of a pound, take $\frac{5}{12}$; here the fractions are to be reduced to a common denominator: 36 is the first numerator, and 20 the second numerator, their difference is 16; and 48 is the common denominator; so that $\frac{16}{48}$, or $\frac{1}{3}$, in its lowest terms, is the difference between $\frac{3}{4}$ of a pound, and $\frac{5}{12}$ of a pound.

To subtract a compound fraction from a simple one.

Rule. Reduce the compound fraction to a simple one, and then work as before.

Example.

From $\frac{13}{14}$ take $\frac{2}{3}$ of $\frac{8}{9}$; say, twice 8 is 16, and 3 times 9 is 27, therefore $\frac{16}{27}$ is equal to the compound fraction: then $\frac{13}{14}$ and $\frac{16}{27}$ must be reduced to a common denominator, thus: 13 times 27 is 351, the first numerator; 16 times 14 is 224, the second numerator; and 14 times 27 is 378, the common denominator. Then subtract 224, the second numerator, from 351, the first numerator, and the remainder is 127, which place over 378, the common denominator, thus $\frac{127}{378}$ *Ans.*

When a simple fraction is to be deducted from a whole number.

Rule. Subtract the numerator of the fraction from the denominator, and place the remainder over the denominator, and carry 1 to subtract from the whole number, &c.

Example.

From 12 l. take $\frac{5}{8}$ thus, say 5 (the numerator) from 8 (the denominator), and there remains 3, which place

place over the denominator 8, thus $\frac{3}{8}$; then 1 from 12 and there remains 11. So the answer is, *l.* 11 $\frac{3}{8}$, or *l.* 11—7—6.

Multiplication of Vulgar Fractions.

Rule. **M**ultiply the numerators into one another for the numerator of the product; and then do the same by the denominators, for the denominator of the product.

Example.

Multiply $\frac{3}{4}$ of a pound, by $\frac{5}{6}$ of ditto; say, 3 times 5 is 15, the numerator; and 4 times 6 is 24, the denominator; so the answer is $\frac{15}{24}$, or in its lowest term $\frac{5}{8}$.

You are to note, That multiplication in fractions lessens the product, though in whole numbers it augments it; as above $\frac{5}{8}$ or 12 *s.* 6 *d.* is less than $\frac{5}{6}$ or 16 *s.* 8 *d.* and also less than the other fraction $\frac{3}{4}$ or 15 *s.* The reason of which I have not here room to insist on; but it is given in my *Arithmetic*, in multiplication of vulgar fractions; to which book, I refer the reader for that, and sundry enlargements in the several rules of the science of arithmetic.

2. *To multiply a whole number by a fraction.*

Rule. Multiply the integer by the numerator of the fraction, and place the product over the denominator.

Example.

$$\begin{array}{r} \text{Multiply } 56 \text{ l. by } \frac{3}{4} \\ \begin{array}{r} 56 \\ 3 \\ \hline 168 \\ 4 \end{array} \left. \vphantom{\begin{array}{r} 56 \\ 3 \\ \hline 168 \\ 4 \end{array}} \right\} \text{Facit.} \end{array}$$

This improper fraction $\frac{168}{4}$ reduced according to rule, makes but 42 *l.* which is less than 56; and confirms what was above asserted, viz. that multiplication of fractions lessens the product, &c.

3. *To multiply a simple by a compound fraction.*

Rule. Reduce the compound fraction to a simple one, as before taught, and work as above.

Example.

Multiply $\frac{6}{8}$ of a pound by $\frac{2}{3}$ of $\frac{3}{4}$ of a pound, say, 6 times 6 is 36, and 8 times 12 is 96. So that the answer is $\frac{36}{96}$, or $\frac{3}{8}$ in its lowest terms; equal to 7 *s.* 6 *d.*

O

Division

Division of Vulgar Fractions.

Rule. **M**ultiply the numerator of the divisor into the denominator of the dividend, and the product is the denominator of the quotient; and then multiply the denominator of the divisor into the numerator of the dividend, and the product will be the numerator of the quotient.

Example.

Divide $\frac{15}{6}$ by $\frac{2}{5}$, $\frac{15}{6} \div \frac{2}{5}$ quotient.

Here 16 multiplied by 2, gives 32; and 15 by 3, gives 45: so that the quotient is $\frac{45}{32}$, equal to $1 \frac{13}{32}$ as in the work.

Again, suppose $\frac{24}{6}$ was divided by $\frac{2}{3}$, the quotient will be $\frac{72}{2}$ equal to 1 integer, or whole thing. And so for any other example.

Reduction of Decimal Fractions.

What a decimal fraction is, hath been already shewn. The next step is, how to reduce a vulgar fraction into a decimal: which is no more than to annex ciphers at discretion (that is 2, 3, or 4, &c.) to the numerator, and then divide it by the denominator.

Example 1.

Reduce $\frac{3}{4}$ of a pound Sterling to a decimal:

4) 3,00 } that is 75 hundredths, equal to 3 qrs of an
 75 } thing, whether money, weight, measure, &c.
 as being $\frac{3}{4}$ of 100; and so 24 hundredths is, in decimals, the quarter of any thing, as being $\frac{1}{4}$ of 100, and five tenths expresses the half of any thing, as being the $\frac{1}{2}$ of 10.

In reduction of decimals sometimes it happens that a cipher or ciphers must be placed to the left hand of the decimal, to supply the defect or want of place in the quotient of the division.—In this case always remember, that so many ciphers, as you annex to the denominator of the vulgar fraction, so many places you must point off in the quotient towards the left hand; but if there be not so many places to point off then you must supply the defect by placing a cipher or ciphers to the left of the decimal.

Example 2.

Reduce 9 d. or $\frac{9}{240}$ to the decimal of a pound Sterling, thus:

140) 9,0000 (,0375

720 . .

1800

1680

1200

1200

(0)

Here are but three places in the quotient, viz. 375; and therefore I cannot point off 4 for the four ciphers annexed to 9; therefore I prefix, 0 to the left of the quotient, 375, thus, ,0375, and then it is 375, ten thousandth parts of an integer.

The more ciphers you annex, the nearer you bring your decimal to the truth: but in most cases, four ciphers annexed are sufficient. But when you are to reduce $\frac{1}{4}$, $\frac{5}{12}$, or $\frac{3}{4}$ (as above) of an integer to a decimal, or any number of shillings to a decimal of a pound, two ciphers are sufficient. One example more.

Example 3.

Reduce 3 farthings to the decimal of a pound, that is, the vulgar fraction $\frac{3}{16}$, 960 farthings being a pound. 960) 3,000000 (,003125. The work being performed according to the division, with two ciphers prefixed, quotes ,003125, or 3125 ten hundred thousandth parts of a pound.—By the same method, the vulgar fractions of weight, measure, &c. are reduced to decimals.

Example 4.

How is 12 pounds weight expressed in the decimal of 1 C. weight *Avoirdupois*, or 112 lb. the vulgar fraction is $\frac{12}{112}$, and the decimal, 1071 found as before; thus,

112) 12,0000 (,1071

112

80, &c.

The remainder 48 is not worth notice, being less than the 10000th part of an unit, or 1.

Example 5.

How is 73 days brought to the decimal of a year? vulgarly thus expressed $\frac{73}{365}$.

365) 73,0 (,2 Ans. 2 tenths.

730

(0)

Thus proved, 36,5

73

Here 365, the days in a year, is divided by 10, twice; and the quotients added together, and they make 73 days.

Valuation

Valuation of Decimals.

TO find the value of a decimal fraction, whether of coin, weight, measure, &c.

Rule. Multiply the decimal given, by the units contained in the next inferior denomination, and point off as many places from the right hand as you have in your decimal; so those figures towards the left of the point are integers or whole numbers: and those on the other side towards the right hand are parts of 1 or unity; that is, so many tenths, hundredths, thousandths, or ten thousandths of one of those integers, whether a pound, a shilling, or a penny, &c. or of a tun, a hundred, a quarter, or a pound weight, &c. And so of any other integer, of what kind or quality soever.

Examples.

,476 Parts of a pound Sterling.
20 Shillings a pound.

9,520
12 Pence 1 Shilling.

Ans. 6,240
9 s. 6 d. 960 4 Farthings 1 penny.
parts, or $\frac{1}{4}$
of 1 d. ,960 Parts, or almost $\frac{1}{4}$ of 1 d.

,476 Parts of a tun wt.
20 C. 1 tun.

9,520
4 qrs. 1 C.

Answer. 2,080
9 C. 2 qrs. 2 lb. 240 parts. 28 l. 1 qr. of C.

2,240

In the example of money, I multiply the fraction by 20, and point off 520 for the three places in the decimal, &c. and the answer is 9 s. 6 d. $\frac{1}{4}$ nearly.

In the example of weight I proceed as in that of money (the fraction being the same), but with differ-

rent respect to the inferior denominations; and the answer is 9 *l.* 2 *qrs.* 2 *lb.* $\frac{1240}{1000}$ of a pound wt.

To find the value of a decimal in money in a brief method, *viz.*

Rule. Always account the double of the first figure (to the left hand) for shillings; and if the next to it is 5, reckon 1 shilling more; and whatever is above 5, call every one, ten; and the next figure so many ones as it contains; which tens and ones call farthings; and for every 24, abate 1: as admit the last example of money, *viz.* 476; the double of 4 is 8, and there being one 5 in 7, (the next figure), I reckon 1 *s.* more, which makes 9 *s.* and there being 2 (in the 7 above 5), they are to be accounted two tens, or 20; which with the next figure 6 being so many ones, making 26 farthings; and abating 1 for 24, they give 6 *d.* and a farthing more.

Addition of Decimals

IS the same in operation as in whole numbers; only in setting down, care must be taken that the decimal parts stand respectively under like parts; that is, primes under primes, seconds under seconds, thirds under thirds, &c. and the integers stand as in whole numbers.

Example.

| Integers | Thirds | Seconds | Primes | Parts | Primes | Seconds | Thirds | Fourths | Fifths |
|----------|--------|---------|--------|-------|--------|---------|--------|---------|--------|
| 2 | 4 | 6 | ,4 | 2 | 6 | ,4 | 7 | 9 | 6 |
| 7 | 4 | ,4 | 2 | ,4 | 2 | ,0 | 6 | 4 | 2 |
| 9 | ,0 | 6 | ,0 | 7 | 6 | ,0 | 0 | 6 | |
| 6 | 5 | ,7 | 9 | 4 | ,0 | 0 | 0 | 4 | ,7 |
| 4 | 2 | ,0 | 0 | 5 | ,5 | | | | ,9 |
| <hr/> | | | | | | | | | |
| 4 | 3 | 7 | ,7 | ,0 | 5 | 1 | ,4 | 7 | 6 |
| | | | | | | 2 | ,1 | 4 | 9 |
| | | | | | | | | 8 | 2 |

Note, There must be as many places pointed off, as there are in that number which has most decimal places.

The casting up of the foregoing examples, is the same with addition of one denomination, in whole numbers: the total of the first (supposing them pounds sterling) is 437 *l.* and ,705 parts. The second is 1 *l.* and ,4760 parts. And the third is 2 *l.* and 14982 parts.

Subtraction of Decimals.

THE numbers must be placed as before in addition, and then proceed as in subtraction of numbers of one denomination.

| <i>l. pts.</i> | <i>l. pts.</i> | <i>l. pts.</i> |
|----------------|----------------|----------------|
| 46,51 | 140,42 | 4762,0 |
| 9,24 | 91,7462 | 0,472 |
| <hr/> 37,27 | <hr/> 48,6738 | <hr/> 4761,528 |

Multiplication of Decimals.

Here the placing the numbers and the operation, is the very same as in the whole numbers; remember only to point off, towards the right hand, so many places for decimals, as you have decimal places, in both *multiplicand* and *multiplier*.

Examples.

| (1) | (2) | (3) |
|-----------------|---------------|--------------|
| 24,6 | 4602 | ,2796 |
| 2,5 | ,075 | 26 |
| <hr/> 1230 | <hr/> 23010 | <hr/> 16776 |
| 492 | 32214 | 5592 |
| <hr/> 61,50 | <hr/> 345,150 | <hr/> 7,2696 |
| (4) | (5) | (6) |
| ,07214 | ,083 | 4,25 |
| ,006 | ,16 | 1,09 |
| <hr/> 5,0043284 | <hr/> 498 | <hr/> 3825 |
| | 083 | 4250 |
| | <hr/> 5,01328 | <hr/> 4,6325 |

Note, That where there are not a competent number of figures, or places to point off, such defect is supplied with ciphers to the left hand; as in the 4th and 5th examples, according to what was before hinted in reducing a vulgar fraction to a decimal.

Division

Divifion of Decimals

IS the same in operation as in whole numbers; the only difficulty is to know how many decimal places to point off towards the left hand of the quotient; to which end remember this rule: observe how many decimal places there are in the divisor, and in the dividend, and find the difference; and whatsoever it is, so many places must be pointed off to the right hand of the quotient.

Example.

Divide 12,345670 by 6,789

12,345670 (1,818
6789...

In this example the dividend hath three decimal places more than the divisor, wherefore I point off three places to the right hand of the quotient, viz. 818; so the quotient is integer, and ,818 parts.

55566
54312

12547
6789

57580
54312

(3268)

Divide 3,46000 by 1,23) 3,46000 (2,813
246...

Here the difference between the decimal places in the divisor and the dividend is three places, as in the foregoing examples; therefore ,813 is pointed off for the decimal fraction, and the quotient is 2 integers, and ,813 thousandths of an integer.

1000
984

160
123

370
369

(1)

Thus much for fractions vulgar and decimal; wherein I have been as concise as possible, and worked with as much plainness as I could invent.

B O O K

B O O K - K E E P I N G.

THE next qualification to fit a man for business after *arithmetic*, is the art of *book-keeping*, or *merchants accounts*, after the Italian manner, by way of double entry.

It is not without good reason that most people of business and ingenuity are desirous to be masters of this art; for if we consider the satisfaction that naturally ariseth from an account well kept, the pleasure that accrues to a person by seeing what he gains by each species of goods he deals in, and his whole profit by year's trade; and thereby also to know the true state of his affairs and circumstances, so that he may, according to discretion, retrench or enlarge his expences, &c. as he shall think fit.

This art of *book-keeping*, or *merchants accounts*, is talked of by many, but truly understood but by very few. For every petty schoolmaster in any bye corner, will be sure to have *merchants accounts*, expressed on his sign, as a principal article of his ability in teaching; though, strictly speaking, for want of the practice part, he knows hardly any thing of the matter, and consequently incapable of teaching it.

Instructions, notes, rules, and directions, for the right ordering and keeping *merchants accounts* by the excellent order of charge and discharge, commonly called *debtor and creditor*.

Of the books in use.

THE books of principal use are the *waste-book*, (some called the *memorial*), *journal*, and *ledger*.

Waste-book.

IN this book must be daily written whatever occurs in the way of trade; buying, selling, receiving, delivering, bargaining, shipping, &c. without omission of any one thing, either bought or sold, borrowed, &c.

The *Waste-book* is ruled with one marginal line, and three lines for pounds, shillings, and pence, and the day of the month, and year of our Lord, is inserted.

the middle of the page. In this book, any one may write, and on occasion any thing may be blotted out, if not well entered, or any error be made.

JOURNAL.

Into this book every article is brought out of the *waste-book*, but in other terms, in a better style, and in a fairer hand, without any alteration of ciphers or figures; and every parcel, one after another, are progressively set without intermission, to make the book, or several entries of it, of more credit and validity in case of any law-dispute, or any other controversy that may happen between merchant and merchant. In this book you are to distinguish the debtor and creditor, or in other terms the *debit* and *credit*. And to this book you must have recourse for the particulars of an account, which in the *ledger* are entered in one line. In this book also the day of the month is usually placed in the middle of the page; it is ruled with double marginal lines, for references to the *ledger*, and with three lines for *l. s. d.* as the *waste-book*.

Of the LEDGER.

From the *journal* or *day-book* all matters or things are posted into the *ledger*, which, by the Spaniards, is called *El libro grande*, as being the biggest book, or chief of accounts. The left-hand side of this book is called the *debtor*, and the right the *creditor* side; and the numbers or *folios* of each side must be alike, as the *debtor*, and also as *creditor*. The day of the month (in this book) is set in a narrow column on the left hand, and the month on the left of that: but where kept books, the number in the narrow column referred to the *journal*-page, and the month and day was placed in the broad column, to the right of that; and at the head of each folio is the name of the place of residence, and the year of our Lord; as thus:

London, anno ————— 1771.

But the example of these several books hereafter following, will make the foregoing hints of them much more intelligible.—The following is a general rule, upon which most of the entries in book-keeping depend, viz.

All

All things received, or the receiver, are debtors to the deliverer, or the deliverer.

Waste-book entry.

London, January 1. 1771.

Bought of William Wilkins, of Norton Falgate, 120 yards of white farcenet, at 2 s. 3 d. per yard, to pay in 2 months,

l. 1.

13 10

The Journal entry of the same.

1 Wrought silk debtor to William Wilkins
l. 13—10 for 120 yards of white farcenet
2 at 2 s. 3 d. per yard, to pay in 2 months.
In this example the wrought silks are received, and therefore debtor to William Wilkins the deliverer.

13 10

Again,

Waste-book entry.

January 4.

Sold Henry Hartington 246 lb. nett of indico, at 6 s. 6 d. per lb. to pay in 3 months,

79 19

Journal entry.

3 Henry Hartington Dr to indico, for 246 lb. nett, at 6 s. 6 d. per lb. to pay in 3 months.

79 19

Once more.

Waste book entry.

Bought of George Goodinch, sen. viz.

Cheshire cheese 430 C. $\frac{1}{2}$ at } l. 502—5
23 s. 4 d. per C. — }

Butter 50 firkins, qt. nett } 35—0
2800 lb. at 3 d. per lb. }

to pay at 6 months, ————

537 05

Journal entry.

Sundry accounts Dr to Geo. Goodinch,

l. 537—05 ——— viz.

4 Chesh. cheese, for 430 C. $\frac{1}{2}$, } l. 502—5
at 23 s. 4 d. per C. — }

5 Butter, for 50 firkins, qt. nett } l. 35—0
2800 lb. at 3 d. per lb. }

to pay in 6 months, ————

537 05

Waste-book.

Sold James Jinkins, viz.

| | | |
|---------------------------|---|---------|
| White sarcenet 50 yards, | } | 7—10—0 |
| at 3 s. per yard, | | |
| Indico 50 pounds, at 7 s. | } | 17—10—0 |
| per pound, — | | |

l. s. d.

25

Journal entry of the last.

James Jinkins debtor, to sundry accounts, viz.

| | | | | | |
|---|---|---|---|----|---------|
| To white sarcenet for 50 yards, at 3 s. per yard, | — | — | — | l. | 7—10—0 |
| To indico for 50 lb. at 7 s. | — | — | — | — | — |
| per lb. | — | — | — | — | 17—10—0 |

25

From these few examples of entry, it may be observed, that an experienced person in accounts, and a good writer, may keep a *journal* without a *waste-book*, or a *waste-book* without a *journal*, since they both import the same and the same thing, though they differ a little in words, or expressing.

But however, I shall give methods of keeping each as far as room will give me leave.

(1)

The Waste-book.

London, January 1. — — — 1771.

An inventory of all the money, goods, and debts, belonging to me A. B. of London, merchant, viz.

| | | | | |
|--------------------------|------------|------|-----|----|
| In cash, — — — | 3500, —, — | l. | s. | d. |
| In tobacco, 4726 lb. at | } | 177, | 4, | 6 |
| 9 d. per lb. | | | | |
| In broad cloth 6 pieces, | } | 15, | —, | — |
| at 50 s. per piece, | | | | |
| Dowls 1080 ells, at 2 s. | } | 116, | 13, | 4 |
| 4 d. per ell | | | | |
| Canary wines 9 pipes, at | } | 270, | —, | — |
| 30 l. per pipe, | | | | |
| Due to me from Henry | } | 60, | —, | — |
| Bland, per bond, | | | | |

4138 17 10

| (1) | | l. | s. |
|-----------------------------|--------------|----|----|
| Journal. | | | |
| Inventory, &c. | | | |
| Sundry accts, Dr to Stock | 4138, 17, 10 | | |
| viz. | | | |
| 1 Cash | 3500, —, — | | |
| Tobacco for 4726 lb. at | 177, 4, 6 | | |
| 9 d. per lb. | | | |
| 1 Broad cloth for 6 pieces, | 15, —, — | | |
| at 50 s. per piece, | | | |
| 1 Dowlas for 1000 ells, at | 116, 13, 4 | | |
| 2 s. 4 d. per ell, | | | |
| 1 Canary wines for 9 pipes, | 270, —, — | | |
| at 30 l. per pipe, | | | |
| 3 Henry Bland due on bond, | 60, —, — | | |
| | 4138, 17 | | |

I shall make one page serve for waste-book and journal entries, to save room, and also to have both methods of entry under eye, to make them more intelligibly useful to the reader, he hereby being not obliged to turn over leaf to see their difference of entry.

Waste-book.

| London, January 1. ———— 1771. | | l. | s. |
|--|---------|----|----|
| Owing to William Webb, by | 50 — — | | |
| note of my hand, | | | |
| Ditto to Roger Ruff, the balance of his account, | 16 12 4 | | |
| Ditto to Henry Hern, due the 4th of May next, | | | |
| | 62 — — | | |
| | 128 | | |

Journal.

| | | | |
|--|-----------------|------|--|
| 1 Stock deltor to sundry accounts, | l. 128 — 12 — 4 | viz. | |
| 3 To William Webb, by note of my hand, | 50 — — | | |
| 4 To Roger Ruff, for the balance of his account, | | | |
| 5 To Henry Hern, due the 4th of May next, — — | 16 12 4 | | |
| | | | |
| | 62 — — | | |
| | 128 | | |

London, Feb. 2. ————— 1771.

| | | l. | s. | d. |
|---|---------|----|----|----|
| Sold Thomas Townshend, viz. | | | | |
| 246 lb. of Virginia cut tobacco, at 14 d. per lb. | 14 07 — | | | |
| 460 ells of dowlas, at 3 s. per ell, | 69 — — | | | |
| | | 83 | 07 | — |

Feb. 2.
Journal.

| | | | | |
|---|---------|----|----|---|
| Thomas Townshend Dr to sundries, viz. | | | | |
| To tobacco, for 246 lb. at 14 d. per lb. | 14 07 — | | | |
| To dowlas, for 460 ells, at 3 s. per ell, | 69 — — | | | |
| | | 83 | 07 | — |

Waste-book.

Ditto 24.

| | | | | |
|---|---------|--|--|--|
| Bought of Leonard Legg, 4 pipes of Canary, at 28 l. per pipe, | 112 — — | | | |
| to pay in 6 months. | | | | |

Ditto 24.
Journal.

| | | | | |
|---|---------|--|--|--|
| Canary wines Dr to Leonard Legg, for 4 pipes at 28 l. per pipe, | 112 — — | | | |
| to pay in 6 months. | | | | |

The short lines ruled against the journal-entries are, may be termed posting lines, and the figure on top of the lines denotes the folio of the ledger where the debitor is entered, and the figure under the line shews the folio of the ledger where the credit is entered; and the other smaller figures against the sundry debtors, or sundry creditors, (whether goods or persons), shew also what folios of the ledger they are posted.

The accounts of persons and things are kept in the ledger, on opposite pages, in which those which in the journal are said to be debtors are entered on the left-hand page, with the word *To*, and those to which they are said to be debtors are entered on the right-hand page, with the word *By*.

For instance, the last journal-entry should be posted on the left hand, or debtor-side, of the account of Canary wines, thus :

1771.

Feb. 24. To Leonard Legg — 4 pipes — 112 0 0

And the same should be posted on the right hand, or creditor-side, of the account of Leonard Legg, thus :

1771.

Feb. 24. By Canary wines to pay in 6 months, 112 0 0

There are several other books used by merchants besides those three before mentioned ; as the *cash-book* which is ruled as the ledger, and folioed likewise wherein all receipts of money are entered on the left hand folio, and payments on the right ; specifying in every entry the day of the month, (the year being set on the top), for what, and for whose account the money was received or paid ; and the total debit or credit of each side is to be posted into the ledger, to the account of cash therein, in one line of either side, *viz.* To, or by sundry accounts, as *per cash-book*, folio, &c. which is to be done once a month, or at discretion ; and the particulars of each side, article by article, are to be posted into the ledger to the proper accounts unto which they belong ; with references in the cash-book to the several folios in the ledger ; and carry the balance over led into the cash-book ; by which you may know at any time what cash you have, or ought to have by you.

Another book is a book of charges of merchandise wherein is to be entered the custom and petty charges of any goods shipped, as portorage, wharfage, warehouse-room, &c. which once a month is transferred into the cash-book on the credit-side, making reference to the book of charges of merchandise ; and likewise the same in the debtor-side of the same account in the ledger for the amount thereof.

The next book I shall name is the invoice book, book of factories. In this book is to be copied all voices of goods shipped, either for accounts proper partable ; and also of goods received from abroad, which must always be entered on the left side, leaving the right side blank ; and on the advice of the dispatch of goods sent abroad, and also on the sale of goods received

received from abroad, enter them on the blank or right side; so at first view may be seen how the account stands, &c.

The next is a bill-book, wherein are entered bills of exchange accepted, and when they become due; and when paid, they should be marked so in the margin.

The next is a book of household-expences, for the monthly charge spent in house-keeping; likewise apparel, house-rent, servants wages, and pocket-expences; and this may be monthly summed up, and carried to the credit of cash.

Besides those above mentioned, there must be a book to copy all letters sent abroad, or beyond the seas; wherein the name of the person or persons to whom the letter is sent must be written pretty full, for the reader finding the same.

The next (and what is very necessary) a receipt-book, wherein are given receipts for money paid, and expressed for whose account or use, or for what it is received; to which the receiving person must set his name for himself, or some other, with the year and day of the month on the top.

Lastly, A note or memorandum book, to minute down affairs that occur, for the better help of memory; and of great use where there is a multiplicity of business.

Having given an account of the several books, and their use, the next thing necessary will be to give some few rules of aid, to enable the book-keeper to make proper entries, and to distinguish the several debtors and creditors, *viz.*

First, For money received, make cash Dr to the party that paid it, (if for his own account), and the party Cr.

Secondly, Money paid, make the receiver Dr, (if for his own account), and cash Cr.

Thirdly, Goods bought for ready money, make the goods Dr to cash, and cash Cr by the goods.

Fourthly, Goods sold for ready money, just the contrary, *i. e.* cash Dr and the goods Cr.

Fifthly, Goods bought at time; goods bought are Dr to the seller of them, and the seller Cr by the goods.

Sixthly, Goods sold for time, just the contrary, *i. e.* the party that bought them is Dr to the goods, and the goods Cr by the party.

Seventhly, Goods bought, part for ready money, and the rest for time ; first, make the goods Dr to the party for the whole : secondly, make the party Dr to cash for the money paid him in part of those goods.

Eighthly, Goods sold, part for ready money, and the rest for time : first, make the party Dr to the goods for the whole : secondly, cash Dr to the party received of him in part of those goods.—Or either of these two last rules may be made Dr to sundries ; as goods bought Dr to the selling man for so much as is left unpaid, and to cash for so much paid in ready money : and so on the contrary, for goods sold.

Ninthly, When you pay money before it is due, and are to have discount allowed you, make the person Dr to cash for so much as you pay him, and to profit and loss for the discount ; or make the receiving man Dr to sundries, as before.

Profit and loss is Dr

To cash for what money you pay, and have nothing for it, as discount of money you received before due and for abatement by composition, household expences, &c.

Per contra Cr,

By cash for all you receive, and deliver nothing for it ; as discount for prompt payment, any legacy left you, money received with an apprentice, and by the profit of every particular commodity you deal in, by ships in company, by voyages, &c.

To balance or clear an account when full written.

First, if the Dr side be more than the credit, make the old account Cr by the new ; and if the contrary, make the new account Dr to the old : but if the Dr side be less than the credit, then make the old account Dr to the new, and the new account Cr by the old, for such a rest or sum as you shall find in the account.

2. An account of company, wherein you have placed more received of another than his stock ; then add as much on the debit side as you find on the credit side ; to the end that, in the new account, you may have so much debit as you put in, and so much credit as you have received.

3. In accounts of merchandise, you must enter the gain or loss, before you make the old account Cr by the new.

new, and the new Dr to the old, for the remainder of goods unsold.

4. In the foreign accounts, which you are to keep with a double column, for the dollars, crowns, or other foreign coins, as well as their value in *l. s. d.* which have been received or paid by bills of exchange for goods sold by factors or correspondents, or bought by them for the accounts before; here you must first balance the said inward column of dollars, crowns, &c.

To remove an account full written to another folio.

Sum or add up the Dr and Cr sides, and see the difference, which place to its opposite: as admit the Cr side exceeds the Dr then you are to write the line in the old account to balance on the Dr side, to answer the line on the Cr side of the new account.

How to balance at the year's end, and thereby to know the state of your affairs and circumstances.

YOU must make an account of balance on the next void leaf or folio of your ledger to your other accounts; but after so done, do not venture to draw out the account of balance in the said folio, till you have made it exact on a sheet of paper, ruled and titled for that purpose; because of mistakes or errors that may occur or happen in the course of balancing your ledger; which are to be rectified, and will cause erasements or alterations in that account, which ought to be very fair and exact; and after you have made it to bear in the said sheet, copy fair the said account of balance in the ledger.

The rules for balancing are these, *viz.*

1st, Even your account of cash, and bear the nett rest to balance Dr.

2^{dly}, Cast up all your goods bought, and those sold, of what kind soever, in each account of goods, and see whether all goods bought be sold or not; and if any remain unsold, value them as they cost you, or according to the present market price, ready money, and bear the nett rest to balance Dr.

3^{dly}, See what your goods or wares severally cost, and also how much they were sold for, and bear the nett gain or loss to the account of profit and loss.

4^{thly}, Even all the personal accounts with your Drs

and your Crs in order as they lie, and bear the nett rest of them severally to balance.

5thly, Even your voyages, your factors accounts, wherein is either gain or loss, and bear the nett gain or loss to the account of profit and loss; and the goods unfold to balance.

6thly, Even the account of profit and loss, and bear the nett rest to stock or capital, as an advance to your stock or capital.

7thly, Even your stock, and bear the nett rest to balance Cr.

Then cast up the Dr and Cr sides of your balance and if they come both alike, then are your accounts well kept; otherwise you must find out your error by pricking over your books again, to see whether you have entered every Dr and Cr in the ledger as you ought.

Note, By pricking over the book is meant, an examining every article in the journal, against the ledger, and marking in thus -, or thus +; and upon the second examination thus ||, and upon a third examination thus ||, or any other mark.

Note also, In all accounts of goods, you must keep a column in the middle of the leaf, of each side, for number, weight, and measure.

Though all that hath been said in relation to book keeping, and the several rules thereunto belonging may seem a little abstruse to the altogether unlearned therein, yet there is no such mighty difficulty to instruct them as they may imagine; for these following hints may render what hath been already said intelligible to an ordinary capacity.

1st, Stick close to the text, or general rule before mentioned, viz. That all things received, or the receiver, are debtor to all things delivered, or the deliverer; for this rule holds good in all cases.

2dly, When the Dr (whether person or goods) known, the Cr is easily understood, without mentioning it: for if *A* be Dr to *B*, then *B* is Cr by *A*, for what sum soever it be: also if goods be Dr to *C*, then *C* is Cr by those goods, for the sum they amount to.

— This I mention, because that most authors (if not all that I have met with on the subject of book keeping) spend a great many words, which I think (begging their pardon if I err) might be saved, in a clearer

clarifying the creditor, as well as shewing the debtor, when it may be understood, as aforesaid.

2dly, This art of Italian book-keeping, is called *book-keeping by double entry*, because there must be two entries; the first being a charging of a person, money, or goods; and the second a discharging of a person, money, or goods.

3dly, *Strictly note*, That if the first entry be on the Dr or left hand side of your ledger, the next or second entry must always be made on the right or credit-side of your ledger; for whenever one person or thing is charged, then always another person or thing is discharged for the said sum, let it be what it will.

And so it is in balancing or evening an account, and carrying it to another folio; for if the old account be evened by the balance on the credit-side, then the new account must be debted or charged on the debit-side, for the sum that balanced the old account.

Much more might be said on this *art of book keeping*, if I had room; but I have plainly spoke to the principal fundamentals thereof, which I hope may be sufficient for the instruction and improvement of any intelligent reader.

The next matter I shall go upon, is to shew, or give examples of various kinds of receipts, and promissory notes; also bills of parcels in different trades; likewise bills of book-debts, bills of exchange, with remarks on them; and some other precedents of writings in trade and mercantile affairs.

And first, of receipts of different forms.

| | | |
|--|---|--------------|
| Received, September 23. 1757, of | } | l. s. d. |
| Mr Anthony Archer, the sum of | | |
| ten pounds nine shillings; I say, received | | |
| for my master Brian Barry, per me | | |
| CALEB CATCHMONEY. | | 6—09—00 |

London, September 23. 1771.

| | | |
|---------------------------------------|---|----------|
| Received of Mr Kendrick Keep- | } | 10—11—06 |
| touch, ten pounds eleven shillings | | |
| and sixpence in full payment, per me. | | |
| HENRY HASTY. | | |

Note, The sum received must always be expressed in words at length, and not in figures, in the body of the receipt;

ceipt; but it may and ought to be expressed in figures behind a brace, (as in the two foregoing examples), or else between two lines on the left hand of the name at the bottom of the receipt, (as is shewn in the promissory notes in p. 166), as well as in the body of the receipt.

When a receipt is given in a book, there is no occasion to mention the man's name of whom you receive the money; because that is implied, he being the owner of the book.

A receipt in part of goods sold.

Received, September 24. 1771, of
Mr Timothy Trustlittle, fifty
pounds in part of Indigo sold him the
22d instant, *per me*

l. s. d.
50—00—00

LAURENCE LOVEMONEY.

A receipt given in a receipt-book.

Received, September 26. 1771, the
sum of forty-five pounds, by the
order and for the account of George
Greedy, Esq; *per*

45—00—00

TIMOTHY TRUSTIE.

Received, September 27. 1771, of
Mr Daniel Davenport and com-
pany, one hundred pounds, on account
of self and partner, *per*

100—00—00

JAMES JENKS.

Received, September 28. 1771, of
Mr Peter Punctual, fifty-five
pounds sixteen shillings and nine pence,
in part of tobacco sold him the 24th of
August last past, *per*

55—16—09

FABIAN FUNK.

Received, September 29. 1771, of
the honourable East-India com-
pany, three hundred and fifteen pounds
ten shillings, *per order* and for the ac-
count of Peter Pepper, *per*

315—10—00

STEPHEN STORAX.

Received, October 2. 1771, of the
governor and company of the
bank of England, one thousand six
hundred pounds ten shillings, for self
and company, *per*

1600—10—00

LEONARD LONGPURSE.

Received

Received, October 5. 1771, of the
Worshipful company of Grocers,
forty-nine pounds fifteen shillings, in
full payment, for my father Peter
Plumb, per me

l. s. d.
49—15—00

PETER PLUMB, junior.

Received, November 9. 1771, of the
Right Honourable Sir Samuel Flad-
yer, Knt. Lord mayor of London, the
sum of sixty pounds, for the use of the
Worshipful comp. of Haberdashers, per
CALEB CAREFUL, Clerk.

60—00—00

A rent-gatherer's receipt.

Received, October 24. 1771, of
Mr Aaron Arable, in money
eighteen pounds, and allowed him for
land-tax five pounds, and for repairs
two pounds, in all twenty-five pounds,
in full for half a year's rent due at Mi-
chaelmas last; I say, received for the
use of Laurence Letland, Esq; by vir-
tue of his letter of attorney, per me

25—00—00

ROBERT RENTROL.

Received of Mr Timothy Tenant,
this 25th day of October 1771, six
pounds for a quarter's rent, due at
Michaelmas last, for my master Lan-
cetlet Letfarm, per me

6—00—00

FRANCIS FAITHFUL.

Received, August 14. 1771, of Mr
Peter Bishop twenty-nine pounds
six shillings, in part of a bill of sixty
pounds, due the 3d of Xber next, to
Mr Samson Shuffle, per

29—06—00

FRANCIS FIDELL.

A receipt on the back of a bill of exchange.

September 30. 1771, received the full
contents of the within mention-
ed, being 500 pieces of eight, per
NATHAN NEEDY.

500 pcs. of 8.

Promissory

Promissory notes.

I Promise to pay to Mr Timothy Teazer, or order, sixty pounds, on the 20th of this instant September. Witness my hand this 15th of September 1771.

DANIEL DILATORY.

l. 60 00 00

October 18. 1771.

I Promise to pay to the honourable the directors of the South-sea company, or bearer, on demand, four hundred fifty pounds, for my father James Jones.

WILLIAM JONES.

l. 450

24th of October 1771.

I Promise to pay unto the governor and company of the bank of England, or order, on demand, two thousand pounds.

NAHUM NEEDNOTHING.

l. 2000

October 24. 1771.

I Promise to pay to Miles Man and company, or bearer, on demand, seven hundred sixty-six pounds ten shillings and nine pence, for my master Robert Regular.

LEWIS MARTIN

l. 766 10 9

October 25. 1771.

I Promise to pay to the honourable East India company, or bearer, upon demand, five hundred pounds, for Henry Hudson.

MARTIN MONEYBACK

l. 500

October 26. 1771.

I Promise to pay to Mr Christopher Cash, or order, three months after date, five pounds for value received. Witness my hand this 26th day of October 1771.

ROBERT RUCK

l. 5 00 00

A note given by two.

WE, or either of us, promise to pay to Mr Matthew Mistrust, or his order, six pounds Sterling on demand for value received. Witness our hands this 27th of September 1771.

l. 6—00—00

NATHAN NEEDY.
SAMUEL SURETY.

Witness Nicholas Notice.

A bill of debt.

Memorandum, That I William Want, of London, weaver, do owe, and am indebted unto Mr Timothy Trust, of Westminster, watchmaker, the sum of twenty-five pounds six shillings of lawful money of Great Britain; which sum I promise to pay to the said Timothy Trust, his executors, administrators, or assigns, on or before the 10th day of December next ensuing. Witness my hand this 22d day of October 1771.

WILLIAM WANT.

Witness Titus Testis.

Bills of parcels.

It is usual, when goods are sold, for the seller to deliver to the buyer, with the goods, a bill of parcels, which is a note of their contents and prices, with a total of their value cast up, &c.—These bills ought to be handsomely writ, and in a methodical order, according to the best and customary way of each particular trade.

I shall therefore shew the forms of bills of parcels in some trades and professions, with the shortest methods of casting up the several articles in each bill.

A mercer's bill.

London, September 26. 1771.

Bought of Abel Atlas, and Ben. Burdett, viz.

2 yds $\frac{1}{4}$ of rich flowered satin, at 12 s. 6 d. per yd.

8 yds of sprigged tabby, at 6 s. 3 d. per yd.

5 yds $\frac{1}{4}$ of farrington, at 6 s. 8 d. per yd.

9 yds of mohair, at 4 s. 2 d. per yd.

7 yds $\frac{1}{4}$ of lutestring, at 3 s. 4 d. per yd.

16 7 84

Sometimes the money is paid presently, then the receipt is made as follows:

Received,

Received, the 26th of September 1771, sixteen pounds seven shillings and eight pence, in full of this bill, for my master Abel Atlas and company; per me

FRANCIS FAIRSPOKEN.

A Woolendraper's bill.

London, September 24. 1771.

Bought of Benjamin Broadcloth, 22d of September 1771,

viz.

s. d.

| | | |
|--|-------|---------|
| 7 yds of fine Spanish black, at | 18—4 | per yd. |
| 5 yds $\frac{1}{2}$ of ditto, at | 12—4 | ditto |
| 6 yds $\frac{1}{2}$ of fine mixed cloth, at | 15—9 | ditto |
| 16 yds $\frac{1}{4}$ of frize, at | 3—6 | ditto |
| 4 yds of drap-de-berry, at | 13—5 | ditto |
| 5 yds $\frac{7}{8}$ of superfine Spanish cloth, at | 18—10 | ditto |

A linendraper's bill.

September 26. 1771.

Bought of Marmaduke Muslin, *viz.*

| |
|---|
| 16 ells of dowlas, at 1 s. 4 d. per ell. |
| 4 ells of lockram, at 1 s. 3 d. per ell. |
| 22 ells $\frac{1}{4}$ of holland, at 3 s. 4 d. per ell. |
| 1 piece of cambrick, at 15 s. |
| 85 yds $\frac{1}{2}$ of diaper, at 1 s. 10 d. per yd. |
| 19 yds $\frac{1}{4}$ of damask, at 4 s. 3 d. per yd. |
| 2 pieces of muslin, at 18 s. 10 d. per piece. |

The several articles of these bills are purposely omitted being cast up, for the exercise of the reader in the rules of *practice*; or in those of *multiplication of money*, before shewn; which indeed is the best method of all, for the ready casting up the articles contained in any bill of parcels whatsoever.

Example.

We will take the last article of the woolendraper's bill, *viz.* 5 yds $\frac{7}{8}$, &c. at 18 s. 10 d. per yard.

| | | |
|--------------------------------------|-----------------|-----------|
| | 5 $\frac{7}{8}$ | 18—10 |
| | | 7 |
| <i>l.</i> 4—14—2 | | |
| 16—5 $\frac{1}{4}$ | | 8) 131—10 |
| | | 16—5 |
| <i>Facit l.</i> 5—10—7 $\frac{1}{4}$ | | |

In this example the price is multiplied by the quantity, *viz.* 5 yards $\frac{7}{8}$, according to the rules delivered

in multiplication of money, and the product by 5 is $l. 4-14-2$: then for the $\frac{7}{8}$ of a yard, I multiply the price of the integer, viz. $18 s. 10 d.$ by the numerator of the fraction, viz. 7, and divide by the denominator 8, and the quotient is $16 s. 5\frac{3}{4} d.$ agreeable with the rule spoken to in the doctrine of fractions. Which $16 s. 5\frac{3}{4} d.$ added to the product of $18 s. 10 d.$ multiplied by 5, gives $l. 5-10-7\frac{3}{4}$, as in the operation above.

A grocer's bill.

Bought of Robert Raisin and Peter Plumb, October 4. 1771, viz.

| | C. | qrs. | lb. | l. | s. | d. |
|---------------------|----|------|-----|-----------|--------|----|
| Sugar 2 hhds. qt. — | 17 | 2 | 17 | at 1—10—6 | per C. | |
| Raisins 3 barrels — | 6 | 1 | 19 | at 1—14—5 | | |
| Tobacco 1 hhd. — | 4 | 0 | 12 | at 4—19—4 | | |
| Rice 1 barrel — | 1 | 0 | 15 | at 2—16—4 | | |
| Pepper 1 bag — | 1 | 3 | 19 | at 3—12—4 | | |
| Brimstone — | 2 | 1 | 19 | at 1—19—1 | | |

A hosier's bill.

Bought of Sylvester Slipstocking, October 5. 1771. viz.

| | | |
|---|---|----|
| 5 pair of womens mixed worsted hose, at — 5 s. 7 d. | | |
| 3 pair of womens silk hose, at — | 9 | 4 |
| 22 pair of mens woolen ditto, at — | 3 | 2 |
| 8 pair of womens ditto, at — | 2 | 2 |
| 21 yds of flannel, at — | 1 | 11 |
| 8 pair of threed hose, at — | 3 | 4 |

A fishmonger's bill.

Bought of Leonard Ling, October 6. 1771.

| | | |
|---|-----------|--------|
| 3 C. of haberdine, at — | l. 7—18—6 | per C. |
| 1 C. $\frac{1}{2}$ of ling, at — | 8—12—6 | |
| 1 C. $\frac{1}{2}$ of stock fish, at — | 4—10—6 | |
| 6 barrels $\frac{1}{2}$ of white herrings — | 3—10—2 | |
| 1 barrel of red herrings — | 2—12—6 | |
| 95 dried salmon, at — | 0—10—2 | |

Note, Of haberdine or ling, 124 is a hundred; of stock-fish and herrings, 120 to the hundred, 1200 to a thousand, and 12 barrels to a last.

A leatherseller's bill.

Bought of Henry Hide, October 17. 1771. viz.

| | s. | d. |
|---------------------------------|------------|-------------------------|
| 15 large oiled lamb-skins, at — | 1—3 | $\frac{1}{2}$ per skin. |
| 13 kipp of goat-skins, at — | 3—4 | |
| 137 alumed sheep-skins, at — | 1—3 | |
| 19 calves skins, at — | 4—3 | |
| 85 oiled buck-skins, at — | 12—9 | |
| 10 Russia hides, at — | 12—9 | |
| 60 dicker of hides, at — | l. 15—11—6 | |

Note, 50 goat-skins make a kipp; and other skins are fivescore to the hundred. A dicker is 10 hides or skins, and 20 dickers a last.

A pewterer's bill.

Bought of Andrew Antimony, October 7. 1771. viz.

| | l. | s. | d. |
|--|----|----|----|
| 9 hard metal dishes, wt. 42 at 14 d. per lb. | 2 | 9 | — |
| 1 dozen of ditto plates | 0 | 17 | — |
| 1 chamber pot of ditto | 0 | 4 | — |
| 1 standish of ditto | 0 | 4 | — |
| 2 tankards of ditto | 0 | 5 | 10 |
| 18 best spoons | 0 | 4 | 6 |
| 3 hard metal porringers | 0 | 3 | — |
| 1 salt of ditto | 0 | 1 | 10 |
| 1 set of castors | 0 | 10 | — |
| | 4 | 19 | 2 |

*Bills on books debts.**A woollendraper's bill.*

| 1771. | Mr Francis Frize, | Dr. |
|-----------|--|--------------|
| | | s. d. |
| April 20. | To 16 $\frac{1}{2}$ yds of black cloth, | |
| | at — | 18 3 per yd. |
| Ditto 24. | To 4 $\frac{1}{2}$ yds of drap-de-berry, | |
| | at — | 15 6 |
| May 4. | To 35 yds of mixed grey cloth, | |
| | at — | 10 5 |
| 17. | To 9 yds of fine ditto, at — | 17 3 |
| June 12. | To 12 $\frac{1}{2}$ yds of fine broad cloth, | |
| | at — | 17 3 |

If the gentleman pays the whole bill, then make the receipt thus :

Received the 19th of October 1771, of Mr Francis Frize, the sum of fifty-four pounds, *l.*
*£*54. *£*c. in full of this bill, and of all accounts,
 for my malter David Draper,
per MICHAEL MEASUREWELL.

A mercer's bill.

1771. | Madam Dinah Dilatory Dr to Bryan Brocade, *viz.*
 Yds. s. d.
 March 6. | To 16½, of flowered satin, at 14 9 *per* yd.
 April 14. | To 14 of Venetian silk, at — 11 8
 Ditto 16. | To 99 of mohair, at — 6 3
 May 16. | To 14½ of flowered damask, at 9 7
 June 7. | To 5½ of Genoa velvet, at — 21 6
 Ditto 25. | To ¾ of lutestring, at — 4 7
 If part of the bill is paid, write thus :
 Received of Madam Dinah Dilatory, l. s. d.
 twelve pounds ten shillings, in part of 12 10 00
 payment, for my matter Bryan Brocade.
per HENRY HUNTER.

A cornchandler's bill.

1771. | Mr Robert Racer Dr to Lionel Livery.
 s. d.
 April 24. | To 5 quarters of oats, at 2 3 *per* bush.
 May 16. | To 9 bushels of beans, at 4 10
 June 19. | To 7 bushels of bran, at — 1 10
 To 19 bushels of oats, at — 1 11
 Ditto 25. | To 16 bushels of beans, at 3 11

A tobacco-nist's bill.

| | | | |
|-----------|---|------------------|---------|
| 1771. | Mr Fume Dr to Rich. Raifecloud, viz. | | |
| May 1. | To 1 hhd of tobacco, qt. nett, | d. | |
| | 569 lb. at ————— | 10 $\frac{1}{2}$ | per lb. |
| Ditto 25. | To 1 box. qt. 75 $\frac{1}{2}$ lb. nett, at | 11 $\frac{3}{4}$ | |
| June 4. | To 5 bags of old Spanish, qt. nett, | | |
| | 671 lb. at ————— | 3 $\frac{1}{2}$ | |
| July 12. | To $\frac{1}{2}$ hhd, qt. 334 gross, tare 42, | | |
| | nett 293 lb. at ————— | 5 $\frac{1}{4}$ | |
| Sept. 7. | To 2 rolls of tobacco, qt. 94 lb. at | 9 $\frac{1}{8}$ | |

A stationer's bill.

| | | | |
|------------|---|----|----------|
| 1771. | Mr Siferah Scribbler Dr to Phineas Foolscap, viz. | | |
| | Reams. | s. | d. |
| July 12. | To 57 of demy paper, at — | 10 | 9 per 1. |
| Ditto 21. | To 195 of 2d foolscap, at — | 6 | 3 |
| Aug. 24. | To 375 of 2d demy, at — | 8 | 2 |
| Sept. 6. | To 95 French royal, at — | 12 | 6 |
| Octob. 26. | To 26 rolls of parchment, at | 15 | 11 |

Note, *A roll of parchment is 60 skins ; a ream of paper 20 quires ; and a bale of paper 10 reams.*

A bricklayer's bill.

| | | | |
|-----------|---|--|--|
| 1771. | Mr Martin Mcfluage Dr to Peter Pantiles, viz. | | |
| March 27. | To 25 thousand bricks, at 16 s. per M. | | |
| Ditto 30. | To 11 thousand plain tiles, at 20s. 6d. per M. | | |
| April 1. | To 28 C. of lime, at 12 s. per C. | | |
| Ditto 9. | To 20 loads of sand, at 3 s. 6 d. per load. | | |
| May 20. | To 140 ridge-tiles, at 8 s. 6 d. per C. | | |
| June 24. | To 90 days work myself, at 3 s. per day. | | |
| | To 90 days my man, at 2 s. 6 d. | | |
| | To 90 days another bricklayer, at 2 s. 6 d. | | |
| | To 90 days for 2 labourers, at 20d. a day each. | | |

Note, *1000 plain tiles is 1 load ; and 25 bags or bushels of lime 1 C. A brick must be 9 inches long, and 4 $\frac{1}{2}$ inches broad. Bricks are of three sorts, plaice bricks, red and grey stock bricks.* —

Here it will be convenient to give a general rule for the casting up any thing sold by the thousand, as
bricks,

bricks, tiles, clinkards, or Flanders paving bricks, and several other things mentioned in the book of rates, viz. barrel-hoops, goose-quills, oranges and lemons, squirrel-skins, billets, &c.

And the easy rule is this, viz.

Multiply the given number by the shillings in the price, (if the price be at so many shillings per M), and always cut off three figures or places toward the right hand; and the figures towards the left hand are shillings, which divide by 20, to bring them into pounds: and those figures separated towards the right hand, multiply by 12, the next inferior denomination; and still cut off, or separate three places towards the right hand, and the figures towards the left are pence; and the three last figures cut off, multiply by 4; and still separate three places towards the right hand, and the figures towards the left are farthings.—And if the price be shillings and pence, or shillings, pence, and farthings per thousand, then multiply by the shillings as before, and take the parts for pence and farthings, as in the rule of practice; add these together, and proceed as above directed.

Example 1.

$$\begin{array}{r}
 2465 \\
 17 \\
 \hline
 172550 \\
 24650 \\
 \hline
 419050 \text{ Ans. } 419 \text{ s. } 0\frac{1}{2} \text{ d. or } 20 \text{ l. } 19 \text{ s. } 0\frac{1}{2} \text{ d.} \\
 12 \\
 \hline
 0600 \\
 4 \\
 \hline
 2400
 \end{array}$$

Q 3

Example

Example 2.

6d. $\frac{1}{2}$ 261324 plain tiles, at 16 s. 6 d. per thousand.

$$\begin{array}{r} 1567944 \\ 261324 \text{ Ans. } 4311 \text{ s. } 10 \text{ d. } \frac{608}{1000} \text{ f.} \\ 130662 \text{ or } 215 \text{ l. } 11 \text{ s. } 10 \text{ d.} \end{array}$$

$$\begin{array}{r} 4311 | 846 \\ 12 \end{array}$$

$$\begin{array}{r} 10152 \\ 4 \end{array}$$

$$\begin{array}{r} 608 \end{array}$$

When things are sold by the hundred, as Dutch and English pantiles; then follow this rule, *viz.*

Multiply the given quantity by the shillings in the price, and take parts for the pence and farthings (if any) as before; then from the right hand of the sum cut off two places, and proceed as in the last rule.

Example 1.

1726 pantiles, at 7 s. per C.

$$\begin{array}{r} 7) \\ \hline 120 | 82 \\ 12 \\ \hline 984 \\ 4 \\ \hline 5136 \end{array}$$

Ans. 120 s. 9 d. $\frac{3}{4}$, or 6 l. 0 s. 9 d. $\frac{3}{4}$ and $\frac{36}{100}$ of a farthing.

Example

Example 2.

6 d. — $\frac{1}{2}$ 2964 stock bricks, at 2 s. 6 d. per C.
 2'

 5928 *Ans.* 74 s. 1 d. $\frac{80}{100}$ f. or 3 l. 14 s.
 1482 1 d.

 74 | 10
 112

 1 | 20
 4

 80

Of bills of exchange.

Bills of exchange are either inland or foreign; the inland bills are drawn by one trader in one city or town, upon another of another city or town in the same kingdom; as London upon Bristol, or Exeter upon London, &c.; and these chiefly concern our shopkeepers, and wholesale traders either of town or country; and the foreign more immediately concern the merchant.

Bills of exchange, if handsomely drawn, must be writter in a fair hand, on a long piece of paper, about three inches broad, and writ in form after the following precedents.

A bill payable at sight.

London, 5th October 1771.

AT sight hereof, pay to Mr Gregory Greedy, or his order, the sum of fifty pounds, for value received of Christopher Cash; and place it to account, as per advice from

To Mr Peter Punctual,
 grocer in High-street,
 Bristol.

Your humble servant,

DANIEL DRAWBILL.

Note, A bill at sight is payable three days after the acceptor seeth it.

Exon,

Exon, November 14. 1771.

S Even days after sight hereof, pay to Mr Nathan Needy, or his order, twenty-four pounds ten shillings, for the value received here of Mr Timothy Transfer, and place it to account, as per advice from
 To Mr Simeon Certain, Your friend and servant,
 haberdasher in Milk-street, London. MICHAEL MONEYSMAN.

If Mr Needy sends his servant, Andrew Benson, to receive the money; after he hath writ his name on the back of the bill, (which is his order), the servant must write a receipt to his Master's name, thus:

R Eceived, November 16. 1771, the full contents of the within-mentioned bill, being twenty-four pounds ten shillings.

Witness,
 Andrew Benson.

NATHAN NEEDY.

A foreign bill of exchange.

London, October 6. 1771, for 460 crowns, at
 56 d. $\frac{3}{8}$ Sterling per crown.

A T usance pay this my first bill of exchange (my second or third not being paid) unto Mr Henry Vernon, or order, four hundred and sixty crowns, at 56 d. $\frac{3}{8}$ per crown, for the value received of Mr Samuel Thompson, and pass it to account, as per advice from, Sir,
 To Mr Will. Walker, Your humble servant,
 merchant in Paris. EBENEZER REYNOLDS.

Another.

London, 17th October 1771, for 480 dollars, at
 55 d. $\frac{1}{8}$ per dollar.

A T three usance pay this my first of exchange, unto Mr William Wealthy, or order, four hundred and eighty dollars, at 55 d. $\frac{1}{8}$ Sterling per dollar, for the value received of himself, and place it to account, as per advice from
 To Mess. Daniel and David Bernardisson, Your humble servant,
 merchants Aleppo. MARK MERCATOR.

Note

Note, *Usance* between England and France, or Holland, is one calendar month; between England and Spain, or Portugal, two months; between England and Italy, three months, &c.

Once more.

Bristol, 8th October, 1771, for 600 pieces of eight, at 53 d. $\frac{3}{8}$ per piece.

A T double usance pay this my first bill of exchange unto Mr Lawrence de Luz, or his order, six hundred pieces of eight Mexico, at fifty-three pence $\frac{3}{8}$ Sterling per piece of eight, for value received of Gomes Henriques, and pass it to account, as per advice from yours.
To Mr Simon Surepay, WILLIAM-HENRY HERN.
merchant in Leghorn.

Notes on bills of exchange.

1. THE acceptor of any bill is become absolute debtor to the person to whom the bill is payable, for the contents thereof.
2. The person to whom the bill is payable, must demand the money the very day it becomes due; and if the acceptor die before it becomes due, it must be demanded of the executor or administrator.
3. The drawer of any bill must always give his correspondent a letter of advice, that he hath drawn such a bill on him for such a sum, &c.
4. None may pay a bill without such a letter of advice.
5. In England a bill is due the third day after the expiration of the time mentioned in the bill.

Of indorsing.

IT frequently happens, that between the acceptance of a bill, and the time of payment, the party to whom it is first made payable, hath occasion to pay it away; if so, he writes his name on the back of the bill, which is his order, (as said before), and gives it to the person he is indebted to, and then he is empowered to receive the money: and it may be, the second person also wants to pay it away; and then he writes his name likewise under the other, and delivers it to a third person to receive the money: and it may be the third does the same, and delivers it to a fourth person,

person, &c. All that do so are indorsers: and he that last hath the bill, if the acceptor will not pay it, may sue him, or the indorsers, or drawer, or any of them, for the money.

An indorsement is generally in these words, viz. *Pay the contents of the within-mentioned bill to Henry Hasty.*

GEORGE GREEDY.

But generally the name only is accounted sufficient.

Of protesting.

When a bill is to be *protested*, the party that hath the bill must go to a *public notary* (not a common *scrivener*) whose business it is: and he goes with you to the acceptor's house, and demands payment, &c. And then he draws up a *protest* according to law, which is to be returned to the drawer within the time limited, &c.

It is needless to give here the form of a *protest*, because no man can do it himself.

A bill of debt.

KNow all men by these presents, that I Lawrence Lackcash, of Southwark, vintner, do owe and am indebted unto Charles Creditman, of the same place, salter, the sum of one hundred and fifty pounds of lawful money of Great Britain; which said sum I promise to pay unto the said Charles Creditman, his executors, administrators, or assigns, on or before the 24th of December next ensuing the date hereof. Witness my hand and seal this 6th day of April 1771.

Sealed and delivered
in the presence of

LAWRENCE LACKCASH

A bill for money borrowed.

Received and borrowed of Oliver Overcash, of London merchant, fifty pounds, which I do hereby promise to pay on demand. Witness my hand this 8th day of April 1771.

l. 50

PETER PENURY

Notary

Master

Image

Sailors.

The charge of noting and protesting a bill.

| | s. d. | | s. d. |
|--------------------------------|-------|-------------------------|-------|
| Noting, { within the city, 1 6 | | Pro { within 3 0 | |
| { without the city, 2 6 | | { testing { without 5 0 | |

The form of a bill of loading.

SHIPPED, by the grace of God, in good order, and well conditioned, by Edward Export, of London, merchant, in and upon the good old ship called (the *Bilboa merchant of London*), whereof is master under God for this present voyage, (Martin Mizen of London mariner), and now riding at anchor in (the port of London), and, by God's grace, bound for (Cadiz), to say (1 bale of stocking-baize, and 1 trunk, containing five hundred pair of silk stockings, contents, &c. as per invoice), being marked and numbered as per margin, and are to be delivered in the like good order at the aforesaid port of (Cadiz) the danger of the seas only excepted, unto (Mr Thomas Drake, merchant there), or to his assigns, he or they paying freight for the said goods, (three pieces of eight per C. wt.), with primage and average accustomed. In witness whereof, the master, or purser, of the said ship hath affirmed to (three) bills of lading, all of this tenor and date; one of which (three) bills being accomplished, the other (two) to stand void. And so God send the said good ship to her desired port in safety. Amen.

dated in London, the 8th of April 1771, insides and contents unknown to
MARTIN MIZEN.

The several words included in the parentheses, are to be put into the several vacant places that are in a blank bill of lading.

also, Average is the general allowance made to the master of the ship, of 1 d. or 2 d. in every shilling freight; primage, a small allowance to be distributed among the sailors.

The

The form of an Invoice.

Port-Royal in Jamaica, April 24. anno 1771.

Invoice of five barrels of indico, five hhds of sugar, and five hhds of pimento, shipped on board the George of London, George Jones commander, for account and risk of Mess. John and Thomas Fisher, of London, merchants, being marked and numbered, as per margin; contents, colts, and charges, as in the following example.

| viz. Indico 5 B. | | | | l. | s. | d. |
|--------------------------------------|------------|------------|--------------------------|-------------------|--------|------|
| l. F. | 143 | lb. | | | | |
| N ^o | 143 | | | | | |
| 12) | 146 | | | | | |
| to | 152 | | | | | |
| 125 | 172 | | | | | |
| 756 lb. nett, at 2 s. 2 d. per lb. — | | | | 18 | 18 | — |
| Sugar 5 | | | | | | |
| hhds. Tare. | | | | | | |
| N ^o | C. gr. lb. | C. gr. lb. | | C. gr. lb. | | |
| 126 | 11-3-27 | 1-2-19 | | Gross | 68 | 0-00 |
| to | 12-2-19 | 1-3-00 | | Tare | 8-3-12 | |
| 130 | 13-2-13 | 1-2-16 | | Nett | 59 | 0-16 |
| | 14-1-15 | 1-3-11 | | at 24 s. per C. | 76 | 0-5 |
| | 15-1-10 | 1-3-22 | | | | |
| 68-0-00—8-3-12 | | | | | | |
| Pimento lb. | | | | | | |
| N ^o | hhds. | Tare. | 2026 | gross. | | |
| 131 | lb. | lb. | 389 | tare. | | |
| to | 432 | 84 | | | | |
| 135 | 396 | 72 | Nett 1657 | at 11½ d. per lb. | 78 | — |
| | 410 | 81 | | | | |
| | 376 | 70 | | Charges. | | |
| | 412 | 82 | To cost of 5 barrels and | | | |
| | | | 10 hhds, | — | 4-7-9 | |
| | 2026 | 389 | To storage, | — | 1-0-0 | 5-7 |
| To commission at 5 per C. | | | | | 36 | 15 |
| Errors excepted, per A. B. | | | | | 11 | 16 |

An Account of sales.

Port-Royal in Jamaica, July 24. 1771.

A Count of sale of 2765 ells of brown ozenbrigs, 1112 yards of blue hartford, 2 pieces of grey cloth, qt. 39 yards, 50 pair of fine worsted hose, and 175 ells of bag holland, received from on board the ship Good Success, Capt Samuel Sharp commander, for account of Lawrence Lucky of London, merchant, is Dr

| | | | | |
|--|--------------------------------------|-----|----|-----------------|
| To portage of ditto | — — — — — l. 00 — 17 — 06 | l. | s. | d. |
| To commission of sales | — — — — — 01 — 01 — 11 | | | |
| To storage, at $\frac{1}{2}$ per C. | — — — — — 06 — 11 — 11 $\frac{1}{2}$ | | | |
| | | 20 | 10 | 4 $\frac{1}{2}$ |
| To the nett product carried to the credit of your account, bad debts excepted, | — — — — — | 241 | 6 | 4 $\frac{1}{2}$ |
| | | 261 | 16 | 9 |

Per contra Cr.

| | | | |
|---|-----|----|---|
| By 2765 brown ozenbrigs, making 3456 $\frac{1}{4}$ yds, at 8 $\frac{1}{2}$ d. per yard, sold Ambique Baker, | 122 | 8 | 2 |
| By 1112 yds of blue linen, sold at 7 $\frac{3}{4}$ d. per yd, | 35 | 18 | 2 |
| By James Sinart, for 39 yds of cloth, at 15 s. per yard, | 29 | 5 | 0 |
| By Lawrence Monk, for 50 pair of hose at 7 s. 10 d. per pair, | 19 | 11 | 8 |
| By ditto for 175 ells of bag holland, at 6 s. 3 d. per ell, | 54 | 13 | 9 |
| | 261 | 16 | 9 |

Errors excepted, July 24. 1771, per

CHARLES CAREFUL.

Business at the water-side, concerning exporting and importing of goods, &c. entering them at the custom-house, &c.

When there are goods to export, and ready packed, &c. there must first be made a bill of entry (as it is called) of the contents, after this form, viz.

At the Loyal Merchant, William Worm, for Barbadoes,
EDWIN EXPORT.

Three cases of haberdashery.

Five tuns of beer, &c.

R

Of

Of these bills there must be seven, one of which must be in words at length, and the other may be expressed in figures. These are by the clerks of the custom-house entered into several books for that purpose.— If some goods pay custom, and others not, then there must be made two entries; one for those that pay custom, and another for those that pay not; and likewise you must have two cockets.

A *cocket* testifies the payment of all duties, and is writ on a small piece of parchment, in the following words:

Know ye, that Edwin Export, merchant, for three cases of haberdashery, and five tuns of beer, in the Loyal Merchant, William Worm, for Barbadoes, hath paid all duties. Dated 9th November 1771.

On the back side of the *cocket* you must set down the marks, numbers, and quantity of the goods expressed in the inside.—When on clean paper you transcribe your bill of entry upon which a shipping bill will be made out, on the back of which, signify the marks, numbers, and contents, as before on the *cocket*; both which being thus indorsed, you are to deliver them to the searcher, at the water-side, who deposits them in the office till the going away of the ship, and then they are delivered to the captain or master of the ship.

If you have not judgment or experience enough to enter your goods yourself, it is but applying yourself to any one of the clerks in the long-room, who make it their business (and good business too) to enter people's goods; and for a shilling (you giving them the contents) they will write your bills, and pass your entries, without giving you any further trouble, or your running any risque of making any false entries, &c.

Entry inwards.

THE ship being arrived, search the entry book in the long-room, and you will find the name of the ship and captain, and also the waiters that are to attend the delivery of the ship, and at what key the goods will be landed. The entry inward runs thus:

*In the Mercury, John Keelhaut, from Antigua.
25 bhds of sugar, &c.
56 bags of cotton, &c.*

There

There must be eight of these bills, (though but seven outwards), and one of these must be in words at length, (as well as one of the seven bills outwards), which is for the warrant of delivery; and must be signed by the person in whose name the goods are entered; and the mark also in the margin; which being done, and the fee for entry and custom paid, you will then have from the land-waiters a warrant for the landing and receiving your goods.

When goods are to be exported by certificates, viz. foreign goods formerly imported; these goods being to be sent abroad, or exported to another place or country by a native of England, within twelve, or a stranger within nine months after importation, entitles the exporter to a draw-back of part of the custom paid at the importation of the said goods, (producing a certificate from the comptroller, that they have paid the duties inwards). And the debenture of custom draw-back runs thus:

Debenture.

Christopher Commerce, natural born, did on, &c. make an entry with us of two thousand ells of broad Germany linen, in the Amazon, Capt Stephen Stout, for Jamaica, the subsidy, &c. was paid inwards by, &c. as appears per certificate of the collector inwards: and for farther manifestation of his just dealing therein, he hath also taken oath before us of the same.

Customhouse, London, 9th November 1771.

The oath.

Jurat C. C. That two thousand ells of broad Germany linen above mentioned, was really shipped out, and hath not been relanded in any port or creek in England or Wales, since last shipped, Nov. 9. 1771.

The certificate-cocket.

London; Know ye that C. C. for two thousand ells of broad Germany linen, paid per, &c. the day, &c. last, late unloaden, and now in the Amazon, Stephen Stout, for Jamaica. Dated the 9th of November 1771.

This certificate-cocket is gained by applying to the books of the importer, to know the day, &c. when the custom inward was paid, and by whom; which carry to the long room in the customhouse, and deliver it to

comptroller's clerk of the subsidy inward and outward, with an account of what you would export, &c.

A little before was mentioned at what key the goods should be landed, and therefore here it is proper to name the keys (or rather quays) and wharfs that goods are usually landed at ; which are these, viz.

Somer's-key, Smart's-key, Wiggen's-key, Bear-key, Dice-key, Customhouse-key, Potter's-key, Wool-key, Galley-key, Brewer's-key, Ralph's-key, Cbeſter's-key, Lyon's-key, Cox's-key, Hammond's, Young's, and Gaunt's keys. And the wharfs are, *Freſh-wharf* and *Botolph-wharf*.

Besides these, there are certain places called *docks*, which are harbours cut into the land, where there is no current, but only a flow, and an ebb, occasioned by the rise and fall of the tide in the river of Thames : and these are convenient for the laying of vessels, hoys, lighters, barges, and boats, and are these, viz.

Billingsgate-dock, Sabb's-dock, Tower-dock, St Catharine's-dock, Wapping-dock, Hermitage-dock, Execution-dock, and Limehouse-dock. And above bridge, *Queenhithe-dock, Puddle-dock, Whitefriar's-dock, and Scotland-yard dock.* And on Southwark, or Surry-side, are *Saviour's-dock, Clink-dock, and Savery's-dock*, below the *Bridge-yard*, and several others for private uses. — But more particularly eminent on that side the water, is the *Bridge-yard*, for landing sundry sorts of merchandises, but chiefly from the ports of England.

Of wharfage and lighterage.

WHarfingers have several managers over them, and also a committee to redress grievances, &c. and clerks of the stations, with lighter managers, and have the letting of many warehouses, (which now are very fine and commodious, being rebuilt since the sad fire in Thames-street), cellars, &c. and have the privilege of keeping lighters for the carriage of goods to and from ships.

The rates of wharfage

Are generally computed at 12 *d.* per tun, whether outward or inward ; excepting sugar from the West Indies, which pay 2 *s.* per tun, 4 hogheads being accounted a tun (though they weigh more) ; cranage is included in the 12 *d.* per tun wharfage ; and for lighterage, the wharfingers have 12 *d.* for 4 hogheads of sugar

sugar that come from the West-Indies; and for wine and other goods, the lighterage is half as much as the wharfage.

Husbands of ships.

WHERE several persons are concerned in a ship, there is usually a husband chosen by them, to take an account of every merchant's goods, &c. and pay the wharfage, lighterage, portorage, &c.; and these husbands are to collect every merchant's proportion, when they do the owners freight.

Of mensuration of planes and solids.

THE several kinds of measuring are three, viz.

1st. *Lineal*, by some called *running measure*, and is taken by a line, and respects length without breadth; the parts of which are,

12 inches 1 foot, 3 feet 1 yard, 16 feet and an half 1 rod, pole, or perch.

All kinds of ornamental work, such as cornice, freeze, &c. are measured by *running measure*.

2^{dly}, *Superficial*, or square measure, is that which respects length and breadth; and the parts are,

144 inches 1 foot, 72 inches half a foot, 36 inches one quarter of a foot, 18 inches half a quarter of a foot, 272 feet, and a quarter, one rod, 136 feet half a rod; 1296 inches, or 9 feet, one superficial or square yard.

3^{dly}, *Solid*, or cube measure, which respects length, breadth, and depth, or thickness; and the parts are,

1728 inches 1 foot, 1296 inches three quarters of a foot, 864 inches half a foot, 432 inches one quarter of a foot, and 27 feet 1 solid yard.

Superficial measure.

TO measure things that have length and breadth, such as board, glass, pavement, wainscot, and land, is to take the dimensions of the length and breadth according to the customary method used in each particular; for instance, board and glass are measured by the foot, the dimensions are taken in feet and inches, and the content given in feet.

The dimensions of wainscoting, and paving, plastering, and painting, are taken in feet and inches, and the content given in yards.

Of the square and superficial content or area.

The squaring of any number, is multiplying it into itself, as 12 inches multiplied by 12 inches, make 144 square inches. The superficial content or area of any thing is found four several ways, viz. by whole numbers, by decimals, by practice, and by cross multiplication; in each of which methods I shall give examples of operation.

A square hath its sides perpendicular and equal.

An oblong hath its sides perpendicular, and those that are opposite equal; but the adjacent sides are unequal; boards, wainscots, ceilings, windows, doors, &c. are commonly of this figure.

When any thing is to be measured, it must be considered what form or fashion it is of; and then it must be measured according to the several rules for each figure.

First, If it be a square or oblong, then the length and breadth must be multiplied one by the other, which gives the content in square measure, and that product must divided by its proper divisor, according to the name in which the content or area is to be given.

Example.

Admit a board be 12 inches broad, and 8 feet, or 96 inches long, how many square or superficial feet doth it contain?

| | |
|--------|--------------------|
| 96 | |
| 12 | |
| L. 96. | 144) 1152 (8 feet. |
| | 1152 |
| | (c) |

Here the length in inches is multiplied by the breadth in inches, and the product 1152 divided by 144, the square inches in a foot, quotes 8 feet square for the content of the board.

A rule for dispatch.

If the length of a board, or piece of glass, be given in feet, and the breadth in inches, multiply the one by the other, (without any reduction), and divide the product by 12, and the quotient will be the answer in feet, and the remainder will be parts of a foot. So the foregoing example might have been done sooner, by dividing 96 the length by 12 the breadth, and it quotes 8 feet for the content, as by the former way.

Example.

Suppose a board be 14 feet long, and 15 inches broad, what is the content in square feet?

14 feet long.

15 inches broad.

So the answer is 17 feet and $\frac{1}{2}$; and so for any other example of this kind.

$$\begin{array}{r} 12 \overline{) 210} \\ \underline{120} \\ 90 \\ \underline{84} \\ 6 \end{array}$$

Feet $17\frac{6}{12}$ or $\frac{1}{2}$

Or consider thus :

$$\begin{array}{r} 14 \\ \text{by } 1-3 \\ \hline 14 \\ 42 \\ \hline 14 \\ \frac{1}{4} \text{ inch. } 3\frac{2}{4} \text{ or } \frac{1}{2} \\ \hline \text{Ans. } 17\frac{1}{2} \end{array}$$

Here 3 inches is the $\frac{1}{4}$ of a foot, wherefore $\frac{1}{4}$ of 14 is taken and added to 14, and it makes 17 feet and 2 equal to $\frac{1}{2}$.

Another example worked four different ways.

If a board be $12\frac{1}{2}$ feet, or 150 inches long, and 15 inches broad, how many square feet doth it contain?

VULGARLY.

Inches.
150 long.
15 broad.

$$\begin{array}{r} 750 \\ 150 \\ \hline 2250 \end{array}$$

DECIMALLY.

$$\begin{array}{r} 12,5 \\ 1,25 \\ \hline 625 \\ 250 \\ 125 \\ \hline \end{array}$$

Feet 15,625

Operation continued on the following page.

144) 2250 (15 feet.

Feet 15, 62½

144

12

810

Inches 7, 500

720

4

Rem. 90

Quarters 2, 000

Multiply by 12 inches 1 foot.

144) 1080 (7 inches.

1008

Rem. 72

Multiply by 4 the quarters in an inch.

144) 288 (2 quarters or $\frac{1}{2}$

288

...

By cross multiplication.

Feet. Inches.

12—6

1—3

12—0

0—6

3—0

0—1½

Answer 15—7½

By practice

Feet. Inches.

12—6

1—3

12—6

3 inches $\frac{1}{4}$ 3—1½

15—7½

The four methods here used are as follows: first by multiplying the inches together, and dividing by 144, &c. The second work is performed decimally the third method is by cross multiplication; and the last and best is by practice.

Any of these methods may be easily understood by the use of the arithmetical part of this book, except the method by cross multiplication, which I shall explain here.

In the example, 1 foot 3 stands under 12 feet and having drawn a line, say, once 12 is 12; then

I say cross-way, 6 times 1 is 6 inches; so that line is 0 feet 6 inches; then cross-way again, I say, 3 times 12 is 36 inches, the 12's in 36 3 times, or three feet; so that line is 3 feet 0 inches. Lastly, I multiply the inches together, saying 3 times 6 is 18, the 12's in 18 once, and there remains 6, or $\frac{6}{12}$, equal to $\frac{1}{2}$, as in the work.

If a board be wider at one end than the other, then take the breadth in the middle, or add the measure of both ends together, and take the half for the mean breadth, which multiply by the length.

Example.

Suppose a board to be 120 inches long, and the narrowest end 10 inches wide, the broadest end 34 inches wide, what is its content in superficial feet?

Add $\left\{ \begin{array}{l} 34 \text{ broadest end.} \\ 10 \text{ narrowest.} \end{array} \right.$

Sum 44

its half—

is 22 the medium.

120 the length.

144) 2640 (18 feet $\frac{1}{3}$ Answer.

144

1200

1152

Rem. 48 | 4 | 1

or 4 inches; that is 48 the remainder,

144 | 12 | 3 is $\frac{1}{3}$ of 144.

Or thus:

Feet. Inches.

10—00 the length.

1—10 the mean breadth.

In. 10—00

5—00

3—04

For 10 inches $\left\{ \begin{array}{l} 6\frac{1}{2} \\ 4\frac{1}{3} \end{array} \right.$

18—04 Answer.

IF

If a board or piece of glass be ever so irregular, it may be measured very near, by taking the breadth in 5 or 6 places, and add the several breadths together, dividing the total by the number of places, and the quotient will be the mean breadth; which multiply by the length, &c.

Having the breadth in inches of any board, or piece of glass, to know how much in length of that board, or piece of glass, will make a foot superficial.

Rule. Divide 144 by the inches in breadth, and the quotient will be the length of that board that will make a foot.

Example.

If a board be 9 inches broad, what length of that board will make a superficial foot?

$$\begin{array}{r} 9 \overline{) 144} \\ \underline{ 81} \\ 63 \end{array}$$

Answer. 16

Proper directions for joiners, painters, glaziers, &c.

Rooms being various in their forms, take this general rule in all cases, viz.

Take a line, and apply one end of it to any corner of the room; then measure the room, going into every corner with the line, till you come to the place where you first began; then see how many feet and inches the string contains, and set it down for the compass or round; then take the height by the same method.

Glaziers are to take the depth and breadth of their work, and multiply one by the other, and dividing by 144; glass being measured as board.

Having thus shewn the methods of casting up dimensions, I come now to particulars; and the first

Glaziers work by the foot.

If the windows be square, multiply the length by the breadth, which will produce the content, above said.

Example.

Example.

By cross multiplication.

Feet. In.

8—9 high.

7—3 broad.

$$\begin{array}{r} 56-0 \\ 2-0 \\ 5-3 \\ 2\frac{1}{4} \\ \hline 63-5\frac{1}{4} \end{array}$$

By practice.

Feet. In.

8—9

7 feet 3.

$$\begin{array}{r} 61-3 \\ 3 \text{ Inches } \frac{1}{4} 2-2\frac{1}{4} \\ \hline 63-5\frac{1}{4} \text{ Ans.} \end{array}$$

If the windows are arched, or have a curved form, no allowance is made, by reason of the extraordinary trouble, and waste of time, expence or waste of glass, &c. And the dimensions taken from the highest part of the arch, down to the bottom of the window, form the height or length; which multiply by the breadth, and the product will be the answer in feet, &c.

Glassiers are often so very nice, as to take their dimensions, and to measure to a quarter of an inch,

Example.

Feet. In.

4—3 $\frac{1}{2}$ long.

2—7 $\frac{3}{4}$ broad.

$$\begin{array}{r} 8-7 \\ 2-1\frac{3}{4} \\ 6\frac{1}{4}\frac{3}{4} \\ 1\frac{1}{4} \\ \hline 11-4\frac{1}{4} \end{array}$$

6 inches is $\frac{1}{2}$
1 $\frac{1}{2}$ is $\frac{1}{4}$
 $\frac{1}{4}$ is $\frac{1}{8}$

Glass is measured by the foot, as said before; and the price of work is as follows, viz.

| | s. | d. |
|---|----|----|
| English glass per foot, — — — — — | 0 | 5 |
| French and crown glass, — — — — — | 1 | 0 |
| Common work, leading included, for every foot square, — — — — — | 0 | 6 |
| New leading old glass per foot, — — — — — | 0 | 3 |
| Common diamond squares, each — — — — — | 0 | 1 |

Painter's

Painter's work by the yard.

When the wainscot of a room is painted, you are to measure round the room with a line, as hinted before, and the height is to be taken by girtting a string over all the mouldings from the top of the cornice to the floor; then multiply the compass by the height, and you have the content in feet and inches; which may be reduced into square yards, by dividing by 9.

Example 1.

A room painted,

Feet. In.

Being 45— 8 in compass, } what is the content in
 10 F. 6 high. } square yards?

 456— 8

 22—10

 9) 479— 6

 Yds 53— 2—6 Answer.

Example 2.

If the height of a room painted be 12 feet 4, and the compass 84 feet 11; what square yards doth it contain? Answer, 116 yards 3 feet $3\frac{2}{3}$.

Feet. In.

84—11 compass.

12 F. 4 high.

 In. 1019—00

 4 $\frac{1}{3}$ 28—03 $\frac{2}{3}$

 9) 1047—03 $\frac{2}{3}$

 Yards 116—03—3 $\frac{2}{3}$ Ans.

Note, Double work is allowed in window-shutters, sash-frames and mantle-pieces are reckoned by themselves, unless the mantle-pieces stand in the wainscot, and then they are to be measured as plain work deducting nothing for the vacancy.

Prices.

Common coloured, 3 coats in oil, per yard,
 On old colour, — — — —
 Walnut-tree colour, — — — —

s.

0

0

1

Marb

| | s. | d. |
|----------------------------------|----|----|
| Marble-colour, from 16 d. to | — | — |
| Sash-frames, each | — | — |
| Sash-lights, each | — | — |
| Window-lights, one with another, | — | — |
| Iron casements, | — | — |

2—0
1—0
0—1
0—3
0—3

Joiner's work.

Wainscoting, the dimensions are taken as in painting, viz. by measuring the height, (indenting the string where-ever the plane goes, as well as the painters do where ever the brush goes), and then the compass; which multiply one into the other, dividing the product by 9, and the quotient is the answer in square yards.

Example.

What is the content of a piece of wainscoting that is 9 feet 3 long, and 6 feet 6 broad?

Feet. In.

9—3
6 feet 6

55—6

($\frac{1}{2}$ inch. 4—7 $\frac{1}{2}$

9) 60—1 $\frac{1}{2}$ ($6\frac{2}{3}$ yds Ans.

54

6

The length and breadth being multiplied together, brings it into square feet; which divided by 9, (the square feet in a yard); produces $6\frac{2}{3}$ yards for the answer.

By cross multiplication, thus:

Feet. Inches.

9—3

6—6

54—0

4—6

1—6

0—1 $\frac{1}{2}$

60—1 $\frac{1}{2}$ as before, which divide by 9, &c.

S

Once

Once more.

There is a room wainscoted, the compass of which is 47 feet 3 inches, and the height 7 feet 6 inches; what is the content in square yards? *Answer*, $39\frac{1}{3}$ yards.

Feet. Inches.

47—3 compass.

7—6 the height.

330—9
6 $\frac{1}{2}$ inch. 23—7 $\frac{1}{2}$

9) 354—4 $\frac{1}{2}$

Ans. $39\frac{1}{3}$ or $\frac{1}{3}$ yards.

The prices per yard.

| | s. | d. |
|-------------------------------------|----|-----|
| For good wainscot, | — | 6—0 |
| Wainscoting, not finding stuff, &c. | — | 2—0 |
| Coarse wainscoting, | — | 1—0 |
| Dale wainscoting, finding stuff, | — | 3—0 |
| Not finding stuff, | — | 1—6 |

Carpenter's work.

Roofing, flooring, and partitioning, the principal carpentry in modern buildings, are measured by the square of 10 feet each way, that is, 100 square feet.

For roofing, multiply the depth and half-depth by the front; or the front and half-front by the depth, and you will have the contents.

The dimensions are taken in feet and inches.

Example.

How many squares doth that piece of work contain that measures 199 feet 10 inches in length, and 10 feet 7 inches in height? *Ans.* 21 squares 14 feet $10\frac{1}{2}$ inches.

Operation.

Feet. In.

199—10 long.

10 F. 7 high.

1998—4

6 $\frac{1}{2}$ 99—11

7 $\frac{1}{8}$ 16—7 $\frac{10}{12}$

21, 14—10 $\frac{10}{12}$ *Ans.* 21 squares, 14 feet, $10\frac{10}{12}$ inches.

Again,

The division is performed by pointing off two places towards the right hand, and the number on the left are squares, &c.

Again,

If a floor be 49 feet, 7 inches, 4 parts long, and 26 feet 6 inches broad, how many square feet?

The operation by cross multiplication.

Feet. Inches. Parts.

49 ——— 7 ——— 4

26 ——— 6 ——— 0

294 ——— 0 ——— 0

98 ——— 0 ——— 0

15 ——— 2 ——— 0

24 ——— 6 ——— 0

3 ——— 6

8 ——— 8

0 ——— 2

13, 14 ——— 8 ——— 4 Ans. 13 squ. 14 feet, 8 in .4 pts.

Note, In measuring roofing, no deduction is made for sky-lights, chimney-shafts, &c.

In measuring flooring, from the content of the whole floor in feet, take the content of the vacancy for the stairs, hearths, &c. in feet, and the remainder is the true content; which bring into squares as before.

Note, In partitioning, you must measure the doors, door-cases, and windows, by themselves, and deduct their content out of the whole, except by agreement they are included; and then you must mention in the written agreement, doors, door-cases, and windows included.

There are divers sorts of carpenter's works belonging to a building, viz. Cantaliver cornice, modillion cornice, plain cornice, guttering, rail and ballusters, mantale, pent-house cornice, timber-front, story, breast-panners, shelving, dressing, &c. all which are measured by lineal or running measure. There are also doors and door-cases, lantern-lights with their ornaments, balcony-doors and cases, cellar-doors and curbs, columns and pilasters, cupolas, &c. all which are valued by the piece.

Carpenter's work is done at the following prices, viz.

| | <i>l.</i> | <i>s.</i> | <i>d.</i> |
|--|-----------|-----------|-----------|
| Flooring, finding boards, the square, — | 1 | 15 | 0 |
| Not finding boards, from 2 s. 6 d. to — | 0 | 06 | 0 |
| Roofing with oak, — — — | 2 | 00 | 0 |
| Not finding timber, — — — | 0 | 12 | 0 |
| Partitioning per square, — — — | 0 | 15 | 0 |
| Not finding timber, — — — | 0 | 07 | 6 |
| Stairs with rails and ballusters complete, — | 1 | 10 | 0 |
| Sawing of oak and elm, per 100 feet, — | 0 | 02 | 6 |
| Fences for trees, — — — | 0 | 02 | 0 |

Oak timber is commonly sold for 40 s. per tun (that is, 40 solid feet) in the place; as 30 s. and elm 28 s. per tun.

Note, Carpenters measure the timber-frames of any building (which they call the carcase) by the square of 10 superficial measure, or 100 square feet, as hinted before.

Sawyer's work.

IN this place it may not be improper to say something in relation to the method used by sawyers, in measuring their work. When they work by the great, (as they say), most commonly they measure their work by the superficial foot, so there is no great difficulty in taking the dimensions; for they account the depth of the kerf for the breadth, and the length for the length. The dimensions being thus taken in feet, the content of one kerf superficial may be found by multiplying the length by the breadth; and then having found the number of feet in one kerf, multiply it by the number of kerfs of the same dimensions, and you will have the number of feet in them all.

Note, 1st, When thus they have cast up the whole content of their work in feet, they are paid for it by the hundred, that is, 100 feet.

2^{dly}, That if the kerf be but 6 inches or less in depth, then they have a custom to be paid for kerf and half, (as they express it), *i. e.* for half so much more as it comes to, by measure; and the reason they give for it is, that the trouble is so much the more, on account of often shifting or removing and new binding their timber; and therefore they insist on it as a customary price.

3^{dly}, For breaking work, that is for cutting a piece

of timber or tree through the middle, and slabbing it, (i. e. cutting off the outside pieces), if the kerf be more than 12 or 13 inches deep, they are paid by the foot lineal or running measure, at different prices, according to the various depths of the kerf; and are as follows:

| Inches deep. | d. | qrs. | |
|--------------|----|------|-------------|
| 15 | 1 | | } per foot. |
| 18 | 1 | 2 | |
| 20 | 2 | | |
| 22 | 2 | 2 | |
| 24 | 3 | | |
| 26 | 3 | 2 | |
| 28 | 4 | | |
| 30 | 4 | 2 | |
| 32 | 5 | | } |
| 34 | 5 | 2 | |
| 36 | 6 | | |

4thly, In some places it is customary to allow the sawyer but one breaking kerf in a tree, though there be never so many kerfs deep in it.—But some sawyers claim to have half breaking work, and half hundred-work; that is, if they have four kerfs deep, then they will have two breaking work, and the other two hundred-work

5thly, In sawing bevil work, as hipps, sleepers, &c. post, &c. in bevil-frames, posts or puncheons in polygonal turrets, &c. also cantrails, &c. for these they work by the hundred, but always reckon kerf and half for such sort of work; that is, they reckon half as many more feet of work, than there is really performed.

Bricklayer's and taylor's work.

Of walling.

Walling is measured by the rod statute-measure, being 272 feet and $\frac{1}{4}$ superficial. The method of taking their dimensions is thus: for a wall round an orchard, or the like, they measure the length by a line, going over the buttresses; and for the height they measure over the mouldings (pressing the line to them) even to the middle of the coping: they likewise take notice of the thickness of the wall, that how many half bricks in length the wall is in thickness; for three half bricks, that is, a brick in length,

and one in breadth, is standard thickness; and all walls, whether less or more, must be reduced to that thickness, by this rule, *viz.* Multiply the product of the length and height, by the number of half bricks, that the wall is in thickness; which product divide by 3, and then the quotient by 272, (the $\frac{1}{4}$ being generally neglected in vulgar working), and the quotient will be rods, at a brick and half thick standard-measure.

Example.

Admit the face of the wall measure 4085 feet, and the thickness be two bricks and a half, or five half bricks thick, how many rods doth it contain?

$$\begin{array}{r}
 4085 \\
 \times 5 \\
 \hline
 20425 \\
 3) \quad 20425 \\
 \hline
 272) \quad 6808 \quad (25 \text{ rods, } \textit{Ans.} \\
 \hline
 1368 \\
 \hline
 (8)
 \end{array}$$

When the work is wrought decimally, then you divide by $272\frac{1}{4}$, or 272, 25, which gives the quotient somewhat less. But the measuring of brick-work may be shortened, by having the rod of 16 feet $\frac{1}{2}$ centesimally divided into 100 equal parts, with which you take the dimensions, and the length of the wall in those rods; and 100 parts multiplied by the height give the content in rods, of any wall that is a brick and half thick. Deduction must be made for doors, windows, &c.

A table to reduce brick-work to standard measure *i. e.* a brick and half thick.

| | | | |
|----------------|------------------------|--------------------------------|---|
| <i>Brick.</i> | | } Reduces to a brick and half. | |
| 1 | Subtract $\frac{1}{3}$ | | |
| 2 | Add $\frac{1}{3}$ | | |
| 3 | } Multip. by | | 2 |
| $4\frac{1}{2}$ | | | 3 |
| 6 | | 4 | |

Example.

Suppose a garden-wall to be 254 feet round, and 7 feet 7 inches high, and three bricks thick; how many rods doth it contain?

254.

12

—

In. 3048

$6\frac{1}{2}$ 127

$1\frac{1}{12}$ 21—2

—

3196—2

—

272) 6392—4 ($23\frac{1}{2}$ rods.

Of chimneys.

This brick-work is commonly agreed for by the hearth, and also sometimes by the rod; and the method of taking dimensions is thus: if the chimney stands singly, not leaning against, or being in a wall, and worked upright over the mantle-tree, to the next floor; it is girt about the breast for the length, and the height of the story is taken for the breadth, and the thickness of the jaumbs for the thickness. But if the chimney stands against, or in a wall, which is before measured with the rest of the building, then the breadth of the breast or front, together with the depth of the two jaumbs, is the length; the height of the story the breadth, and the thickness of the jaumbs the thickness. But if the chimney stands in the corner of a room, and has no jaumbs, then the breadth of the breast is the breadth, the height of the story the length, and the thickness the thickness. And for the shaft, it is commonly girt in the smallest part, for the length; and the thickness of both sides, for the thickness; in consideration of the widths, parging, scaffolding, &c.

Note, *There is nothing to be deducted for the vacancy between the hearth and the mantle-tree, because of the widths and the thickening for the next hearth above.*

Gable ends.

Take half the perpendicular for the breadth, and the width of the house for the length, or half the width of the house for the breadth, and the perpendicular for the length, which brings the measure to an oblong, the content of which is found by multiplying the length by the breadth, &c.

Note, *There are several other things in bricklayer's work;*

as cornice, facias, straight arches, cheme-arches, hipps and valleys in tiling, and water-courses: all which are measured by the foot lineal, or running measure. Also piers, pilasters, rustic-work, &c. which are valued by the piece.

| Prices. | | l. | s. | d. |
|---|---|----|----|----------|
| For walls, finding materials, — — | 5 | 00 | 0 | per rod. |
| Not finding materials, — — | 1 | 10 | 0 | ditto. |
| For tiling, finding materials, — | 1 | 05 | 0 | per squ. |
| Not finding materials, — — | 0 | 05 | 0 | ditto. |
| For tiling, finding materials, ex- cept tiles, } | 0 | 10 | 0 | per rod. |
| For stripping without taking down, — | 0 | 05 | 6 | ditto. |
| With taking down, — — — | 0 | 07 | 0 | ditto. |
| For pointing, — — — — — | 0 | 02 | 0 | ditto. |

Paving.

Pavement for cellars, wash-houses, &c. is measured by the square yard.

Example.

If a cellar, wash-house, or court-yard, be paved with bricks, or pitched with pebble, being 9 yards 2 feet long, and 6 yards 2 feet broad; how many yards square doth it contain? *Answer*, 64 yards 1 and $\frac{1}{3}$ feet, as by the following work.

Yds. F.

$$\begin{array}{r} 9 \quad 2 \\ 6 \quad 2 \end{array}$$

$$\begin{array}{r} 54 \quad 0 \\ 6 \quad 0 \\ 4 \quad 0 \\ \hline 1 \frac{1}{3} \end{array}$$

$$\begin{array}{r} 64 \quad 1 \frac{1}{3} \end{array} \text{ Ans.}$$

Yds. F.

$$\begin{array}{r} 9 \quad 2 \\ \hline 6 \text{ yards } 2. \end{array}$$

$$\begin{array}{r} 57 \quad 0 \\ 3 \quad 08 \\ 3 \quad 08 \\ \hline \end{array}$$

$$\begin{array}{r} 64 \quad 1 \frac{1}{3} \end{array}$$

Feet.

29

20

$$\begin{array}{r} 9) \quad 580 \\ \hline \end{array}$$


$$\begin{array}{r} \text{Yds } 64 \frac{1}{3} \end{array}$$

Here the answer is found by three different operations, and the result of each is the same.

Slatiug

Slating

Is valued by the square of 100 feet ; in some places by the rod of 18 feet square ; that is, 36 square yards, or 324 feet.

 In tiling and slating, where there are gutters and valleys, there is commonly an allowance, which is to take the length of the roof-all along upon the ridge, which makes the gutter double measure ; which in some places is allowed, in others not. Sometimes there is an addition for hollow-ware, that is, ridge-tyles, gutter-tyles, corner and dormer tyles ; and here customs differ : for in some places they count one superficial foot for every foot lineal or running measure ; then 100 feet lineal is reckoned a square. In other places, for every 100 of such tyles they reckon one square.

Plastering

Is of two kinds, *viz.* First, Work lathed and plastered, sometimes called ceiling. Secondly, Plastering upon brick-work, or between the quarters in partitioning, by some called rendering ; both which are measured by the yard square, as the joiners and painters do. In taking dimensions of ceiling, if the room be wainscoted, they consider how far the cornice bears into the room, by putting up a stick perpendicular to the ceiling, close to the edge of the uppermost part of the cornice ; and measure the distance from the perpendicular stick to the wainscot ; twice which distance must be deducted from the length and breadth of the room taken upon the floor, and the remainder is the true length and breadth of the ceiling : as suppose a floor is 24 feet long, and 18 feet broad, and the cornice shoots out six inches ; deduct a foot for both ends, and the length of the ceiling is 23 feet ; and the same for the breadth ; it leaves 17 feet broad ; which multiplied together, gives the content, 391 feet, or 43 yards and a half.

Example.

Example.

23 feet the length.

17 feet broad.

161

23

9) 391 (43 yards, 4 feet.

36

31

27

4

If the ceiling of a room be 19 feet, 10 one way, and 17 feet 6 the other, how many square yards does it contain?

By cross multiplication thus :

19 : 10

17 : 6

133

19

14 : 2

9 : 6

5

9) 347 : 1 (38 yds 5 feet 1 inch.

How many yards square are there in a piece of plastering that is 47 feet 4 inches 7 parts long, and 18 feet broad?

F. I. Pts.

47 — 4 — 7

3 times 6 is 18.

142 — 1 — 9

6

9) 852 — 10 — 6 (94 yds, 6 feet, 10 inch. 6 parts.

Price

Prices per yard.

s. d.

| | |
|--|-------------------|
| For every yard of common plastering, finding laths, nails, &c. — — — — — | } 0—9 |
| Not finding laths, — — — — — | 0—4 $\frac{1}{2}$ |
| For white-washing with size, — — — — — | 0—1 $\frac{1}{2}$ |
| Partitioning, finding all materials, — — — — — | 0—3 |

Mason's work.

THE mason's work, consisting of stone, is of two sorts, viz. superficial and solid. Pavements, and the 'face of stone-walls, houses, &c. are measured as brick-work. If the work have ornaments, as capitals, pilasters, rails, and bullusters, &c. then they are valued by the price.

s. d.

| | |
|---|-------|
| For every foot of plain work in walls, &c. — — — — — | 0—8 |
| For plain cornice, about, — — — — — | 1—5 |
| For rough stone wall with lime, 16 $\frac{1}{2}$ feet long, and 1 foot high, per rod, — — — — — | } 1—2 |
| Without lime, per rod — — — — — | 0—3 |
| Paving, digging the stone, and all workman-ship, per square foot, — — — — — | } 0—3 |

Prices of stone and urns.

Rough paving 1 d. per foot ; rough asher, or coping, $\frac{1}{2}$ d. per foot ; fine asher, 3 d. per foot ; base per foot, 1 d. ; carbe per foot, 6 d. ; urns 3 feet high, 1 l. ; 4 feet high, 1 l. 10 s. ; 5 feet high, 2 l. ; and 6 feet high, 3 l.

Land-measure.

And is usually measured by the acre. The dimensions are taken with a chain of four poles in length, which is divided into 100 parts, called links, and 10 square chains make an acre. Let them be 10 in length and 1 in breadth, or 5 in length and 2 in breadth, &c. or 160 square poles ; but to find its content, (if not regularly square), it is generally divided into triangles. Thus a piece of land of four sides (if not square) may be divided into two triangles, a piece of five sides into 3, and a six-sided piece into three triangles.

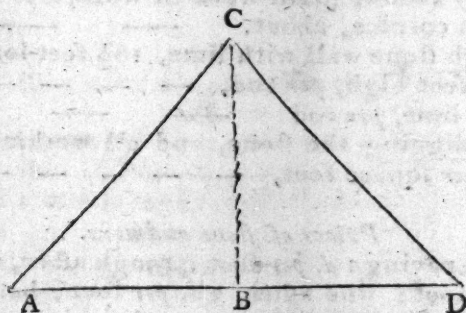
To

Prices

To measure a triangle.

Admit the longest side of the following triangle, viz. A D to be 76 poles, and the perpendicular or dotted line B C to be 30 poles, multiply 76 (the base) by 15, the half of the perpendicular B C, and it produces 1140: or if you multiply the whole perpendicular by half the base, (or longest side), it will produce the same; which divided by 160 (the square poles in an acre), the quotient gives the content of that piece of land in acres; and what remains multiply by 4, and divide by the same divisor, and it quotes roods, &c.

Note, Always the perpendicular is drawn from the opposite angle to the base, or longest side, as in the following figure.

*The operation.*

76 the base.

15 half the perpendicular.

$$\begin{array}{r}
 16 \overline{) 1140} \quad (7 \text{ acres } \frac{2}{8}, \text{ or } \frac{1}{8}. \\
 \underline{1120} \\
 20
 \end{array}$$

All other pieces of land (for the most part) must be divided into triangles, and when measured, their contents added together.

Suppose an oblong plat of ground contain 35 poles broad, and 185 poles long; how many acres is the content?

Rule.

Multiply the length in poles by the breadth, and divide the product by 160, (the square poles in an acre), and the quotient will be the answer in acres; and if the remainder

Be $\left\{ \begin{array}{l} 120 \\ 80 \\ 40 \end{array} \right\}$ its value is $\left\{ \begin{array}{l} \frac{3}{4} \\ \frac{1}{2} \\ \frac{1}{4} \end{array} \right\}$ of an acre.

The work.

185 the length.
35 the breadth.

925
555

160) 6475 (40 acres.
640

The content is 40 acres $\frac{3}{4}$, and 35 poles, or almost 40 acres and a half.

75
Deduct 40 a quarter.

35 poles remain.

By the four pole chain.

Example. There is a plat of ground which contains 6 chains and 25 links in breadth, and 57 chains and 10 links in length; what is the content of that piece of land?

C. Link.

57, 30 length.

16, 25 breadth.

 28650

11460

34380

 5730

Acres 93|11250 cut off 5 places.

 4

No roods, 45000

 40

 Poles 18|00000 (93'ac. 0 rood, 18 poles, *Ans*)

Note, 4 roods or rods is 1 acre, 40 poles 1 rood or rod, so that 1 rood or rod is 1 quarter of an acre.

Note also, That the above chain, commonly called *Gunter's chain*, contains 4 statute-poles in 100 links, so that any number of chains are no more than so many 100 links, as 4 chains are 400 links, and 6 chains 600 links, &c. 160 statute poles are an acre, each pole being 16 feet and an half; therefore in a square chain there are 16 square poles; and if you divide 160 (the square poles in an acre) by 16, (the square poles in a chain), the quotient is 10, the square chains in an acre.

A square chain contains 10,000 square links. (100 multiplied by 100); and therefore it follows that an acre contains 100,000 square links.

To reduce statute to customary measure.

According to a statute made in the 33d of Edward the first, and another in the 25th of Queen Elisabeth a statute pole is 16 feet and an half long, (as said before); but in divers parts of England there are used poles of 18, others of 21, and some of 24 feet long, called customary measure, being in use according to the humour or custom of the place where they are taken. To turn therefore one sort of measure into the other, admit statute-measure to be turned into customary, do thus: multiply the number of acres, roods, and poles, statute-measure, by the square half-yards, square half-feet in a square pole of statute-measure.

and divide the product by the Square half-yards, or square half-feet contained in the pole of the measure customary, and the quotient gives the answer in the latter, in acres, roods, &c.

Example.

In 172 acres statute-measure, how many acres of 18 feet to the pole, or perch?

Acres 172 statute-measure.
121 square half-yards.

144) 20812 (144 $\frac{76}{144}$ acres customary measure.

In a statute-pole are 11 half-yards, which squared make 121 square half-yards; and in a square pole of 18 feet, are 144 square half-yards, &c. For the remainder work as before, viz. by multiplying it by 4, &c. and the next remainder by 40, &c. as spoke to before: so that the answer is, that 172 acres statute-measure, make 144 acres, 2 roods, and 4 poles of such customary measure.

An example of the contrary.

In 543 customary acres of 18 feet to the pole, how many acres of statute-measure, being 16 feet and an half to the pole?

543 customary.
144 square half-yards in a customary acre.

2172

2172

543

121) 78192 (646 statute-acres.

726

55, &c.

The remainder 26 multiplied by 4, produces 104, which not amounting to a rood, should be multiplied by 40, their product is 4160; which, divided by 121, makes 34 perches, and 46 remains. So the answer is, that 543 customary acres, of 18 feet to the pole, makes 46 acres, 34 poles, and $\frac{46}{121}$ of a pole.

Note, Customary acres, as well as statute-acres, contain 160 square poles or perches; the excess of big- is by the bigness of the pole.

Solid Measure

IS that of timber, stone, digging, liquids, &c.; and the rule for working is, to multiply the length, taken in inches, and the breadth together, and then that product by the depth or thickness, and the last product will be the content in cubic-inches; which, if timber or stone, divide by 1728, (the cubic-inches in a foot solid), and the quotient gives the content in solid feet.

Example.

If a tree be 16 feet long, and 18 inches square, how many solid feet doth it contain?

| | | | |
|------------|-----|-------|------------------------|
| Multiply { | 18 | 16 | |
| | 18 | 12 | |
| | 324 | 192 | the length in inches. |
| | | 324 | breadth and thickness. |
| | | 768 | |
| | | 384 | |
| | | 576 | |
| | | 1728) | 62208 (36 feet. |
| | | 5184 | |
| | | 10368 | |
| | | (0) | |

| Square. | Decimally. | By practice. |
|---------|---------------------|-------------------|
| | { 1,5 | 1-6 |
| | 1,5 | 1-6 |
| | 2,25 breadth. | 1-6 |
| | 16 length. 6½ inch. | 9 |
| | 36,00 Ans. | 2-3 |
| | | 4 times 4 is 16 |
| | | 9-0 |
| | | Feet 36-0 Answer. |

In solid measure,

- 40 feet of round } timber is a tun or load.
 50 of hewn }
 1728 inches is a foot of stone or timber.
 27 feet is a yard.
 282 inches is a gallon of ale or beer.
 231 inches is a gallon of wine.

Suppose there is given an oblong piece of timber, whose breadth is 2,25, and thickness 1,64 feet, and length 36,5 feet, how many solid feet are contained therein?

2,25 breadth.
 1,64 thickness.

900
 1350
 225

3,6900
 36,5 length.

184500
 221400
 110700

134,68500 *Ans.* 134,685 solid feet, or 134 $\frac{1}{2}$ nearly.

Of timber measure.

When at any time you would know the content of any piece of timber by vulgar or decimal arithmetic, observe what follows, *viz.* The tree being girted, and one fourth part taken for the side of the square; multiply the length of the side of the square in inches into itself, and that product by the length in feet; which last product divide by 144; but if you multiply by the length, in inches, then your divisor must be 1728; and if any thing remains, divide such remainder by 12, and the quotient will be the odd inches.

Example.

Suppose a piece of timber 15 feet long, and a quarter of the girt 42 inches; what is the content of that piece?

The work.

42 inches the side of the square.

42

84

168

1764

15 feet in length.

F. I.

144) 26460 (183—9 *Ans.*

144

1206

1152

540

432

12) 168 (9 inches.

(0)

Note, In this example 1764 is multiplied by 15 in one line.

But the foregoing example may be worked shorter by decimals, thus:

Squared { 3.5 the side of the square 42 inches.

175

105

12.25

15

6125

1225

183,75 the cont viz 183, $\frac{75}{100}$ or $\frac{3}{4}$, as before

But this common way of taking $\frac{1}{4}$ of the compass for the side of a square; which is equal to the content

the circle in round timber, is erroneous, and gives the solidity somewhat less than the true content: but the true way is, to multiply half the diameter by half the compass, and then that product multiply by the length, which divide by 1728, and the quotient is the content. If you cannot come to measure the end of the piece, you may know the diameter by this proportion, *viz.* as 22 is to 7, so is the compass to the diameter. Or you may find the side of a square of a round Inch. 66 the compass, piece of timber by this rule, *viz.* multiply 2821 by the inches of the compass, and cut off 4 figures to the right hand of the product.

$$\begin{array}{r} 2821 \\ \times 16926 \\ \hline 186186 \end{array} \text{ Ans. } 18\frac{6}{10} \text{ in. nearly.}$$

Having the breadth and depth of a piece of timber or stone, to know how much in length of it will make a solid foot; multiply one by the other, and let the product be a divisor to 1728, thus:

24 broad.
18 thick.

$$\begin{array}{r} 192 \\ 24 \\ \hline \end{array}$$

$$432) 1728 \text{ (4 inches in length. } 1728$$

And thus you may make a table to serve all breadths and depths, by which much labour may be saved in multiplying and dividing, and yet measure any piece of timber thereby very exactly.

In square timber, you must make the inches squared a divisor to 1728, and the quotient will be the answer in inches of length, that will make a foot solid.

Example.

If a piece of timber be 8 inches square, what length of it will make a foot?

$$64) 1728 \text{ (27}$$

Ans 27 inches, or 2 feet 3 inches in length.

$$\begin{array}{r} 448 \\ 443 \\ \hline \end{array}$$

(0)

the square of 8 is 64, &c.

Again,

Again, suppose a piece be 18 inches square, what length will make a foot? *Answer*, $5\frac{1}{3}$ inches.

The square of 18 is 324) 1728 ($5\frac{108}{324}$, equal to $\frac{1}{3}$.

1620

—
(108)

The usual way for tapering timber is by this method, *viz.* Take the dimensions in the middle, and multiply that by the length, which is not accurate; but if the dimensions be taken in several places, and the mean be used, the content thus found will be near the truth.

Digging

IS measured by the solid yard of 27 feet; that is, 3 times 3 is 9, and 3 times 9 is 27, by which are measured vaults, cellars, clay for bricks, &c. Other things are measured by the floor of 324 solid feet.

Example 1.

If a vault or cellar be digged 9 feet deep, $4\frac{1}{2}$ feet long, and 3 feet 9 inches broad, what is its content in solid yards?

Feet.

$4\frac{1}{2}$ long.

9 deep.

—
 $40\frac{1}{2}$

3 feet 9 broad.

—
 $121\frac{1}{2}$

$20\frac{1}{4}$

10

6 inches $\frac{1}{2}$
3 is $\frac{1}{2}$ of 6

27) $151\frac{3}{4}$ (5 yards $16\frac{3}{4}$ feet.

—
16

Example

Example 2.

How many yards of digging will there be in a vault that is 25 feet 4 long, 15 feet 8 broad, and $7\frac{1}{2}$ feet deep?

$$\begin{array}{r} 25-4 \\ 3 \text{ times } 5 \text{ is } 15 \end{array}$$

$$\begin{array}{r} 76-0 \\ 5 \end{array}$$

$$\begin{array}{r} 380-0 \\ 8-5 \frac{1}{3} \\ 8-5 \frac{1}{3} \end{array}$$

4 feet is $\frac{1}{3}$
4 feet is $\frac{1}{3}$

$$\begin{array}{r} 396 \text{ } 10 \frac{2}{3} \\ 7 \frac{1}{2} \end{array}$$

$$\begin{array}{r} 2778-2 \frac{2}{3} \\ 198-5 \frac{1}{3} \end{array}$$

$$\begin{array}{r} \text{Yd. F. In.} \\ 27)2976-80 (110 \text{ } 6 \text{ } 8 \end{array}$$

$$\begin{array}{r} 27 \\ - \\ 06 \end{array}$$

Example 3.

There is a mote that is 648 feet long, 24 feet broad, and 9 feet deep, how many floors?

648 long.

24 broad.

$$\begin{array}{r} 2592 \\ 1296 \end{array}$$

$$\begin{array}{r} 15552 \\ 9 \end{array}$$

Divide by 324) 139968 (432 floors, *Ans.*

&c.

(0)

Solid

Solid bodies being frequently painted, it is necessary to know how to find their superficiality. To find the superficial content of a square, or many sided, or round pillar, multiply the sum of the sides, or circumference, by the height in feet, and the product divided by 9, will be square yards.

Of a globe.

Multiply the circumference in feet by itself, and then that product by this decimal 0,0353678, and this last product will be the content in yards.

To find the superficial content of a pyramid or cone, multiply half the sum of the sides, or half the circumference of the base by the slant height, in feet, and the product divided by 9 will be square yards.

If the pyramid or cone be not complete, that is, if a part of the top be wanting, add together the circumferences at top and bottom, and half their sum, being multiplied by the slant height, will be the superficial content.

Note, A solid yard square of clay will make about 7 or 800 bricks, and the price of making is 7 or 8 s. a thousand; 3 bags (or bushels) and half of lime, and half a load of sand, will lay 1000 bricks.

500 bricks
1000 plain tiles } make a load.
25 bags & C. of lime.

IT may not here be improper, as well for refreshing the memory, as for improving the understanding, and forming the mind with proper notions and ideas of measuring, to give a short repetition by demonstrative geometrical figures, to explain what hath been verbally and arithmetically before expressed.

And, first, for *planometry*, or *superficial* or *flat measure*, some of which is measured by the foot square; as are boards, glass, marble, freestone, and pavements. The dimensions are taken in feet and inches, and the content given in square feet.

Example 1.

Suppose there is an oblong or long square, let it be board, glass, or pavement, &c. that contains on the longest side (or the length) $24\frac{1}{2}$ feet, and the shortest side (or breadth) $14\frac{1}{4}$ feet, as in the following figure, viz.

| | |
|------------------------|--------------------------------|
| 14 $\frac{1}{2}$ feet. | Feet 24 $\frac{1}{2}$ |
| | Area or content is |
| | 349 F. 125 |
| | 14,25 breadth. 24,5 length. |

7125
 5700
 2850

 349,125

Rule. Multiply the length by the breadth, and cut off as many places to the right hand as there are decimals in the length and breadth.

Example 2.

Suppose a board or piece of glass be in the form of *figure the first*, called a rhombus, that is, in the shape of a common pane of glass, or diamond square.

Rule. To measure which, multiply the breadth, *AB* by the length of any of the sides, (for they are all equal), and cut off as many places to the right hand as there are decimal places in both multiplicand and multiplier, as hinted before: as suppose the breadth *AB* 8 feet 38 parts, and the length of the side to be 8 feet 52 parts, then the work will appear thus:

F. P.

8, 52

8, 38

6816

2556

6816

71,3976

3976 is separated by a comma, as above directed, and are so many 10000 parts of a foot.

Example 3.

Again, admit a piece of measurement to be of the form of *figure the second*, called a rhomboides, its length 17 feet 25 parts, and its breadth 8 feet 58 parts.

F. P.

F. P.
17,25 length.
8,58 breadth.

The forementioned figure
hath its opposite sides equal,
and its opposite angles alike.

13800
8625
13800

148,0050 Answer, the content is 148 feet.

Once more.

Suppose a board, piece of glass, pavement, or piece of land, to represent, or be in the form of a triangle, or three cornered figure, expressed as in the shape of *figure the third*. Every triangle is half an oblong, whose length and breadth is equal to the perpendicular and base.

Note, The doted line is the perpendicular, the bottom line the base, and the line from the top of the perpendicular to the left angle of the base is called the hypotenuse.

The measuring of a triangle hath been already shewn, and therefore I shall desist speaking any further thereto.

The *fourth figure* is called a trapezium, and consists of 4 sides: this figure, before it can be measured, must be divided into two triangles, thus; *viz.* by a line drawn from one angle or corner, to the angle opposite to it, as in the figure.

Example 4.

Suppose the dimensions of the trapezium before described to be, *viz.* the base 16 F. 67; the one perpendicular 12 F. 50, and the other 9 F. 68 (as in figure 5), what is the content?

The operation.

| | | |
|-------------------|-------|-------|
| | F. P. | |
| One perpendicular | 12,50 | } add |
| The other | 9,68 | |
| | <hr/> | |
| The sum is | 22,18 | |

| | |
|----------------------------|--------------|
| The half sum is | 11,09, which |
| multiply by the whole base | 16,67 |

produces 184,8703

which is 184 feet, and $\frac{8703}{10000}$ of a foot, equal to 10 inches and half.

Note,

figure
qual,
like.

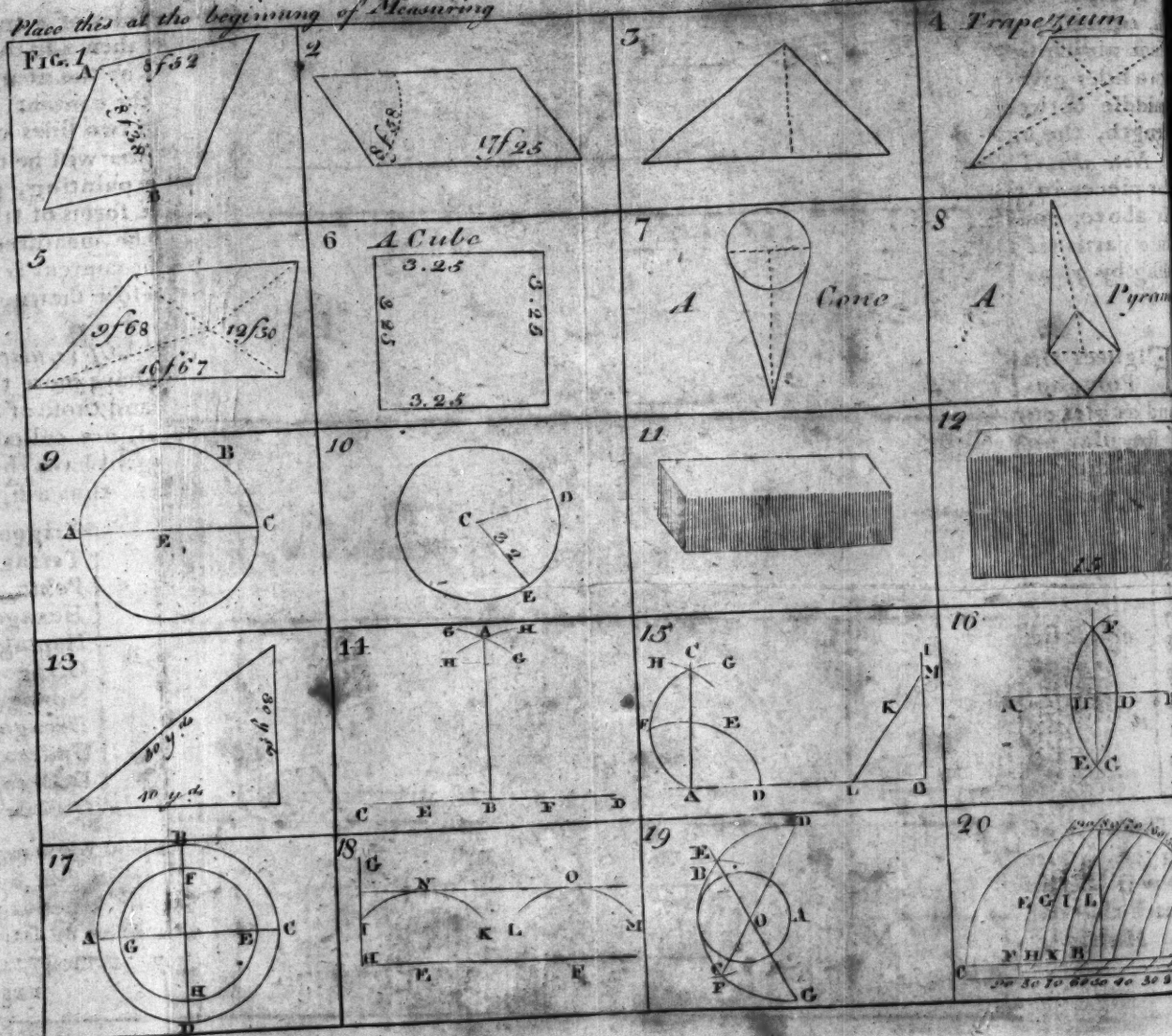
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Place this at the beginning of Measuring



Note, If two sides of a trapezium are parrallel, that is, equidistant, then add them together, and half the sum multiplied by the nearest distance between those two sides gives the content. Or if you measure in the middle between two sides or lines that are of equal length, the answer will be the same.

Note also, The painting, plastering, &c. of irregular pieces in the forms of triangles, or not, if divided as above, may be measured as before; and brought into yards (if the content is to be so given in) by dividing by 9, as before shewn.

Of regular figures.

Figures that have more than four sides, are called Polygons; and those of them that have their sides and angles equal, are called *regular polygons*.

Regular polygons have their names from the number of their sides; thus a figure having

| | | |
|----|--------------------------|-----------------------------------|
| 3 | equal sides, is called a | { Trigon or equilateral triangle. |
| 4 | | { Tetragon or square. |
| 5 | | { Pentagon. |
| 6 | | { Hexagon. |
| 7 | | { Heptagon. |
| 8 | | { Octagon. |
| 9 | | { Nonagon. |
| 10 | | { Decagon. |
| 11 | | { Undecagon. |
| 12 | | { Dodecagon. |
| 15 | | { Quindecagon. |

The area of a pentagon may be found by multiplying the square of its side by the number 1,7204774. Thus if the side of a pentagon be 11 feet, then the square thereof will be 11 times 11, or 121 feet.

Multiply by 1,7204774

121

17204774

34409548

17204774

208,1777654

U

Therefore

Therefore the area of the pentagon will be upward of 208 square feet.

In like manner, to find the area of the

| | | |
|------------|---|------------|
| Trigon, | } multiply the square of the side by | 0,4330127 |
| Tetragon, | | 1,0000000 |
| Hexagon, | | 2,5980762 |
| Heptagon, | | 3,6339124 |
| Octogon, | | 4,8284271 |
| Nonagon, | | 6,1818242 |
| Decagon, | | 7,6942088 |
| Undecagon, | | 9,3656404 |
| Dodecagon, | | 11,1961524 |

Of a circle.

Figure the ninth.

A Circle is contained under one line, called the *circumference* or *periphery*, as *A B C*. All right lines drawn from the centre *E* to the circumference, are equal, and called *radiuses*, or *half diameters*; and the long line through the centre from *A* to *C* is the diameter.

To divide a circle in six equal parts, extend the compasses to half the diameter, as from *A* to the centre *E*, and the extent applied to the circumference will divide it into those parts.

The diameter *A C* divides the circle into two equal parts, each of which is called a *semicircle*; and if a semicircle be divided into two equal parts, those parts are called *quadrants*.

The questions relating to the measuring of the circle and its parts may be solved as follows:

1. The diameter being given, to find the circumference.

Rule. Multiply the number 3,1415927 by the diameter, and the product will be the circumference.

Note. The number 3,1416 will be exact enough in most cases.

Example.

The diameter of a circle being 11 inches, what is its circumference?

3,1416

$$\begin{array}{r} 3,1416 \\ 11 \\ \hline \end{array}$$

$$\begin{array}{r} 3,1416 \\ 3,1416 \\ \hline \end{array}$$

Ans. 34,5575 (or above $34\frac{1}{2}$) inches.

2. The diameter being given, to find the area.

Rule. Multiply the number 0,7853982 (or in common cases 0,7854) by the square of the diameter, and the product will be the area.

Example.

What is the area of that circle whose diameter is 11 inches?

$$\begin{array}{r} 11 \text{ times } 11 \text{ is } 121 \quad 0,7854 \\ \quad \quad \quad 121 \\ \hline \quad \quad \quad 7854 \\ \quad \quad 15708 \\ \quad 7854 \\ \hline \end{array}$$

Answer, 95,0334 square inches.

3. The circumference being given, to find the diameter.

Rule. Multiply the number 0,3183099 (or in common 0,31831) by the circumference, and the product will be the diameter.

Example.

What is the diameter of that circle whose circumference is $34\frac{1}{2}$ inches?

$$\begin{array}{r} 34\frac{1}{2} - 34,5 \quad 0,31831 \\ \quad \quad \quad 34,5 \\ \hline \quad \quad \quad 159155 \\ \quad \quad 127324 \\ \quad 95493 \\ \hline \end{array}$$

Answer, 10,981695 (or almost 11) inches.

4. The circumference of a circle being given, to find its area.

Rule. Multiply the number 0,0795775 (or in common 0,0796) by the square of the circumference, the product will be the area.

U 2

Example.

Example.

What is the area of a circle, whose circumference is $34\frac{1}{2}$ inches?

| | |
|------|---------|
| 34,5 | 1190,25 |
| 34,5 | 0,0796 |
| 1725 | 714150 |
| 1380 | 1071225 |
| 1035 | 833175 |

1190,25 *Ans.* 94,743900 (or almost 95) square inch.

5. The area of a circle being given, to find its diameter.

Rule. Multiply the square root of the area by the number 1,12337, and the product will be the diameter.

Example.

What is the diameter of that circle whose area is 95,0334 square inches?

| | |
|---------------|------------|
| 95,0334 (9,75 | 1,12837 |
| 81 | 9,75 |
| 187) 1403 | 564,85 |
| 1309 | 789859 |
| 1945) 9434 | 1015533 |
| 9725 | 11,0016074 |
| | |

Ans. The diameter is 11 inches.

6. The area of a circle being given, to find its circumference.

Rule. Multiply the square root of the area by the number 3,5449, and the product will be the circumference.

Example.

What is the circumference of that circle whose area is 95,0334 square inches?

| | |
|---------------|-----------|
| 95,0334 (9,75 | 3,5449 |
| | 9,75 |
| | 177245 |
| | 248143 |
| | 319041 |
| | 34,562775 |

Answer, The circumference is $34\frac{1}{2}$ inches.

7. To measure the sector of a circle. See figure 10.

Case the first. If the length of the arch *D E* and the semidiameter *C E* be given :

Rule. Multiply the length of the arch by $\frac{1}{2}$ the semidiameter, and the product will be the area.

Case the second. If the number of degrees contained in the arch and the semidiameter be given :

Rule. Multiply the square of the semidiameter by the number of degrees contained in the arch, and that product by the number 0,0087267, and the result will be the area required.

Example.

Let the arch consist of 90 degrees, or $\frac{1}{4}$ of the circumference, and the semidiameter be $3\frac{1}{2}$.

| | | |
|-------|---------|------------|
| 3,5 | 12,25 | 0,0087267 |
| 3,5 | 90 | 1102,5 |
| 175 | 1102,50 | 436335 |
| 105 | | 174534 |
| | | 872670 |
| 12,25 | | 872670 |
| | | 9,62118675 |

Of solid measure.

SOLID or cube measure hath been already defined, (as well as superficial measure), some of the figures of which are numbered 6, 7, and 8.

To measure a solid in form of a cube, which hath length, breadth, and thickness all equal, you must multiply these into themselves, and the last product gives the solidity or content, either of wood or stone. A cube hath six sides, and is in shape like a die.

Example.

What is the solidity of a cube whose side is 12 inches?

| |
|------|
| 12 |
| 144 |
| 1728 |

1728 the solid inches in a solid foot.

To measure a solid of an unequal length, breadth, and thickness, multiply the length by the breadth, and that product by the height; the last product will be the solidity.

U 3

Example.

Example.

What is the solidity of a block of marble, whose length is 10 feet, breadth $5\frac{1}{4}$ feet, and depth $3\frac{1}{2}$ feet?

5,75

3,5

2875

1725

20,125

10

201,25 the solidity.

The cone is measured by finding the superficial inches at the bottom or base thereof; which multiply by one third of the inches in the length, and that product is the solid quantity in inches; which inches divide by 1728, and the quotient gives the answer in solid feet.

Example of finding the solidity of the cone, decimally, without dividing by 1728.

Let the diameter of the base be 2 feet 6 inches, and the altitude 10 feet 6 inches.

2,5 the diameter.

2,5

125

50

6,25 the square of the diameter.

57854

2500

3125

5000

4375

4,908750 the area of the base.

3,5 one third of the height.

24543750

14726250

17,1806250 the solidity in feet.

This

This method may serve for tapering timber, or for any other thing of the shape represented in figure 7.

To measure a pyramid.

Rule. Multiply the area of the base or bottom by one third of the perpendicular height, and the last product will be the content in solid feet: or one third part of the area at the base, multiplied by the whole altitude, gives the content also.

Examples of both ways.

Suppose there is given a square pyramid, (or figure like a spire steeple), the side of whose base is 4 feet and a half, and the perpendicular height 18 feet, what is the solid content?

| | |
|----------------------------------|---|
| | 6,74 $\frac{1}{3}$ of 20,25 the area at the base. |
| | 18 the whole height. |
| 4,5 | 5400 |
| 4,5 | 675 |
| — | 121,50 |
| 225 | |
| 180 | |
| — | |
| 20,25 | |
| 6 $\frac{1}{3}$ of the altitude. | |

Ans. 121,50, as before.

121,50 *Ans.* 121 feet, and $\frac{50}{100}$ or $\frac{1}{2}$.

When one side of the base is longer than the other, admit one to be $2\frac{1}{2}$ feet, and the other $1\frac{1}{2}$ foot, then multiply the length of the base by the breadth, and that product by one third of the height, as before.

If the base be any polygon, find its area by the rule given in page 218; and then multiply it by $\frac{1}{3}$ of the height.

To measure the frustum or segment, i. e. a piece or part of a pyramid, whose ends are similar regular polygons.

Multiply together the sides of the greater and lesser polygons; multiply also the difference of those sides itself; add the one third part of the second product to

to the first product : multiply the sum by the height, and by the number which belongs to the polygon in p. 218, so shall the last product be the solidity.

To measure the frustum or segment of a cone.

Multiply together the diameters at the top and the bottom of the frustum ; multiply also their difference by itself ; add one third part of the last product, to the first, and multiply the sum by the height of the frustum, and by the number 0,7853982, so shall the last product be the solidity required.

Example.

What is the solidity of the frustum of a cone ; the diameter of the greater end being four feet, that of the lesser end 2 feet, and the height 9 feet ?

| | |
|---|-------------------------|
| 4 | 2 differ. of diameters. |
| 2 | 2 |
| — | — |

8 product of diameters. 4 ; $\frac{1}{3}$ of which is $1\frac{1}{3}$.

8 added to $1\frac{1}{3}$ is $9\frac{1}{3}$, which multiplied by 9, the height produces 84.

Then multiply 0,7854
by 84

| |
|-------|
| 31416 |
| 62832 |
| — |

Solidity 65,9736

Of gauging.

Here is a near sort of kindred or affinity between the art of measuring of timber, and that of gauging or measuring of liquors; for both are performed by cube or solid measure, and therefore not improper closely to follow one another. For as often as there are found 1728 solid or cubic inches in a piece of timber, (of what form soever), so many solid feet it is said to contain: so likewise in the art of gauging, so many times as 282 (the solid inches in a beer or ale gallon) are found in any vessel of such liquor, so many gallons is such a vessel said to hold, and so of wine; but in that the divisor alters, it being 231 solid or cubic inches.

And the gallon of dry measure contains $272\frac{1}{4}$ cubical inches.

Note, Every cubical foot, in beer or ale measure, contains 6 gallons and almost a pint.

The same in wine-measure is 7 gallons and almost 2 quarts.

A cubical foot of dry measure contains 6 gallons, and somewhat above one third of a gallon.

141 inches make two quarts of beer or ale, $70\frac{1}{2}$ inches one quart, and $35\frac{1}{4}$ inches a pint.

To find the content of any vessel, that hath the form of a cube, that is a figure whose breadth, depth, and length are all equal, and is very well represented by the shape of a die commonly played withal.

Rule. Multiply the side into itself, and then again that product by the side; which last product, if for beer or ale, divide by 282, the inches in a beer or ale gallon, and for wine, brandy, &c. by 231, the inches contained in a wine gallon.

Example

Example. Suppose a cube, whose side is 79 inches, I demand the solid content in beer and wine gallons.

| | | | |
|---------------------|-------|--------|----------------------------|
| 79 | 282) | 493039 | (1748 beer or ale gallons. |
| 79 | | 282... | |
| <hr/> | | | Wine G. |
| 711 | | 2110 | 231) 493039 (2134 |
| 553 | | 1974 | 462... |
| <hr/> | | | |
| 6241 | | 1363 | 310 |
| 79 | | 1128 | 231 |
| <hr/> | | | |
| 56169 | | 2359 | 793 |
| 43689 | | 2256 | 693 |
| <hr/> | | | |
| 493039 cube inches. | (103) | | 1009 |
| | | | 924 |
| | | | <hr/> |
| | | | (85) |

To find the content of a parallelopipedon, which is a solid figure contained under six sides, of which the opposites are parallel, and of the form of figure the 12th.

Rule. Multiply the length by the breadth, and that product by the depth, and then divide by 282 for beer or ale, and 231 for wine.

Example. Admit the length to be 95 inches, and the breadth 62 inches, and the depth 23 inches, what is the content in beer and wine gallons?

| | |
|------------------------|-----------------------------|
| | 95 length. |
| 231) | 62 breadth. |
| 135470 (586 wine gall. | |
| 1155 | |
| <hr/> | |
| 1997 | 190 |
| <hr/> | 370 |
| cc. | |
| Rem. (104) | 5890 |
| | 23 depth. |
| | <hr/> |
| | 17670 |
| | 11780 |
| | <hr/> |
| | 282) 135470 (480 beer gall. |
| | 1128 |
| | cc. |
| | <hr/> |
| | Rem. (110) |

To guage a back or square tun.

Example.

Suppose its length 112 inches, breadth 72 inches, and its depth 48 inches, what is its content in solid inches, and also its content in beer gallons?

112 length. 282) 387072 (1372 gallons, *Ans.*
72 breadth. 282...

224

784

8064

48 depth.

64512

32256

1050

846

2047

1974

732

564

387072 solid inches. (168)

To bring these gallons into barrels, divide them by 6, the gallons in a barrel of beer, thus :

36) 1372 (38
108

292

288

Ans. 38 barrels and $\frac{4}{8}$ or $\frac{1}{2}$ of a barrel ; and for the remainder 168, it is something above half a gallon.

(4)

Note, The duty of excise upon strong beer and ale is 6 s. and 6 d. per barrel. Brewers are allowed three barrels in twenty-three for leakage, &c. both for strong and small beer, and for ale two in twenty-two : so that the neat excise of a barrel of strong beer, to be paid by the common brewers is 5 s. $7\frac{1}{2}$ d. and $\frac{7}{24}$ of a farthing ; and of ale 5 s. $3\frac{1}{2}$ d. and $\frac{7}{24}$ of a farthing ; and for small beer 1 s. $3\frac{1}{2}$ d. and $\frac{2}{3}$ of a farthing.

How

or gall.

To

How to guage a copper, round tub, or cask.

If it be of equal bigness both at top and bottom, find the cubic inches that it contains, and then bring it into gallons, as before.

But if it be wider at the top than at the bottom, or the contrary, then take the width or diameter of the tub somewhat above the middle, next to the broadest end if it be taper; or find the mean diameter thus: Suppose the bung diameter to be 26 inches, and the head diameter of the cask to be 23 inches, the difference between which is three inches, two thirds of which make two inches, which added to the lesser of the two diameters, make 25 for the mean diameter sought. Having the mean diameter, proceed to find the contents in solid inches thus: first, square the mean diameter, multiply that square by 0,7854, and the product will give the content of the liquor at one inch deep; and this multiplied by the length, will give the solid inches in the copper, tub, or cask.

Example.

Suppose the mean diameter to be 72 inches, and the length 56 inches.

$$\begin{array}{r}
 72 \\
 72 \\
 \hline
 144 \\
 504 \\
 \hline
 5184 \text{ square.} \\
 ,7854 \\
 \hline
 20736 \\
 25920 \\
 41472 \\
 36288 \\
 \hline
 40715136 \text{ content at 1 inch deep.} \\
 56 \\
 \hline
 244290816 \\
 203575680 \\
 \hline
 2280047616
 \end{array}$$

The
multipl
ongel
gallon

Supp
nches,
a beer

The above found solid inches 228004 brought into gallons, make 808, and 148 solid inches remain, something above half a gallon; in all 22 barrels, 16 gallons and $\frac{1}{2}$ of beer.

Again, admit the mean diameter of a cask of wine to be 14 inches, and the length 72 inches, what is the content in wine gallons?

$$\begin{array}{r}
 14 \\
 14 \\
 \hline
 56 \\
 14 \\
 \hline
 196 \\
 \\
 07854 \\
 196 \\
 \hline
 47124 \\
 70686 \\
 \hline
 7854 \\
 \hline
 153,9384 \\
 72 \\
 \hline
 3078768 \\
 10775688 \\
 \hline
 \end{array}$$

$$231) 11083,5648 \text{ (47,9}$$

$$924$$

$$1843$$

$$1617 \text{ Anf. 48 gall. nearly.}$$

$$2265$$

$$2079$$

$$1866$$

$$\text{etc.}$$

The content of a spheroid may be found thus: multiply the square of the shortest diameter by the longest diameter, and then divide by 538 for beer gallons, and by 441 for wine gallons.

Example.

Suppose a spheroid whose shortest diameter is 74 inches, and the longest 125 inches; what is the content in beer and wine gallons?

$$\begin{array}{r}
 74 \\
 74 \\
 \hline
 296 \\
 518 \\
 \hline
 \end{array}$$

5476 the square of the shortest diameter.
 125 the longest diameter.

$$\begin{array}{r}
 27380 \\
 65712 \\
 \hline
 \end{array}$$

538) 684500 (1272 gallons of beer.
 538 ·

$$\begin{array}{r}
 1465, & \text{&c.} \\
 \hline
 \end{array}$$

(164)
 441) 684500 (1552 gallons of wine.
 441 ·

$$\begin{array}{r}
 2435, & \text{&c.} \\
 \hline
 \end{array}$$

(68)

To find the content of the frustum of a spheroid: to twice the square of the bung diameter, add once the square of the head, and multiply that sum by the length: then for beer divide by 1077; and for wine gallons, divide by 882.

Example.

A cask whose bung diameter is 23 inches, head diameter 21 inches, and length 27 inches; what is the content in beer and wine gallons?

| | |
|-------|-------|
| 23 | 21 |
| 23 | 21 |
| <hr/> | <hr/> |
| 69 | 21 |
| 46 | 42 |
| <hr/> | <hr/> |
| 529 | 441 |

Add

Add $\left\{ \begin{array}{l} 529 \\ 529 \\ 441 \end{array} \right\}$ twice the square of the bung diam.
once that of the head diameter.

1499
27 the length.

10493
2998

1077) 40473 (37 beer gallons.

3231

8163

7539

(624)

882) 40473 (45 wine gallons.

3528

5193

4410

(783)

The extraction of the square and cube roots, of great use
in measuring, gauging, &c.

The square root.

1st, **A** Square number ariseth from the multiplication of a number into itself, the number so multiplied being called the root; thus 4 multiplied by 4, produceth 16; so 16 is a square number, and 4 is the root thereof; so also 4 is the square of 2, for twice 2 is 4, and 9 is the root of 81, for 9 times 9 is 81, &c.

2^{dly}, To extract the square root of any number, is to find another number, which multiplied by (or into) itself, produces the number given; and after the root is found, such a multiplication is a proof of the work.

3^{dly}, Square numbers are either single or compound.

4^{thly}, All the single square numbers, with their respective roots, are contained in the following table, viz.

| | | | | | | | | | |
|----------|---|---|---|----|----|----|----|----|----|
| Roots. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Squares. | 1 | 4 | 9 | 16 | 25 | 36 | 49 | 64 | 81 |

5thly, When the square root of any number less than 100 is required, and that number is not expressed in the table above; then you are to take the root of that square number in the table, which (being less) comes the nearest to the given number. Thus if the square root of 50 were required, then, since 49 is the nearest square number in the table, therefore its root 7 will be the root of the given number nearly.

6thly, A compound square number, is that which is produced by a number consisting of more places than one, multiplied by itself, and is never less than 100: so 729 is a compound square number, produced by the multiplying 27 into itself.

7thly, The root of any number under 100 may be easily known by the foregoing table of single squares: but to extract the root of a compound number of several places, observe the following directions.

Example 1.

Let the square root of the number 45796 be required.

1. Set a point over the place of units thus, 45796̇, and so successively over every second figure towards the left-hand, as thus, 45796̇; and thus 45796̇; but in decimals you must point from the place of units towards the right hand, omitting one place, as above; and if the places of decimals are odd, affix a cipher towards the right hand of them to make them even. Your number thus prepared, draw a crooked line on the right of the number, as in division: and indeed the operation of the square root is not much unlike division; only there the divisor is fixed and in the square root we are to find a new one for each operation. I say, having made a crooked line thus 45796̇, seek, in the foregoing table for the nearest square to the first point on the left hand, which here is 4, the root of which is 2, which root place on the right hand of the crooked line, and set its square 4 under the said point, as below

$$\begin{array}{r}
 45796 \quad (2 \\
 4 \\
 \hline
 (0)
 \end{array}$$

then subtract it, and there remains 0 : to the remainder, bring down the next point 57 thus :

$$\begin{array}{r} \dot{4}5\dot{7}9\dot{6} \quad (2 \\ 4 \\ \hline 057 \end{array}$$

which call the resolvend ; then double the root of the first point, and place it on the left hand of the resolvend, thus :

$$\begin{array}{r} \dot{4}5\dot{7}9\dot{6} \quad (2 \\ 4 \\ \hline 4) 057 \end{array}$$

call the 4, the double of the root 2, thus placed on the left hand of the crooked line, the divisor, and seek how often 4, the divisor, can be taken in 5, the first figure of the resolvend 57, (for you are to omit the last figure towards the right hand), which here is once, place one to the right of the root 2, and also of the divisor 4, thus :

$$\begin{array}{r} \dot{4}5\dot{7}9\dot{6} \quad (21 \\ 4 \\ \hline 41) 057 \end{array}$$

Then multiply the divisor (now 41) by the figure last placed in the root, viz. 1, place it under the resolvend, and subtract it therefrom.

$$\begin{array}{r} \dot{4}5\dot{7}9\dot{6} \quad (21 \\ 4 \\ \hline 41) 057 \\ 41 \\ \hline 16 \end{array}$$

Then bring down the next point, viz. 96, and place it on the right of the remainder 16, for a new resolvend

X 3

wend

vend or dividend, thus :
 next double the quotient
 or part of the root, viz.
 21, and place it for a
 new divisor to the new
 resolvend 1696, thus :

$$\begin{array}{r}
 45796 \text{ (21)} \\
 4 \\
 \hline
 41) 057 \\
 41 \\
 \hline
 42) 1696
 \end{array}$$

then seek how oft 42 in 169? (till reserving or omitting
 the unit-figure of the resolvend, or dividend, as afore-
 said), and I find I can have it 4 times, which I place
 in the quotient and in the divisor, and proceeding as
 before, the work will appear thus :

$$\begin{array}{r}
 45796 \text{ (214 root.)} \\
 4 \\
 \hline
 41) 057 \text{ resolvend.} \\
 41 \\
 \hline
 424) 1696 \text{ resolvend.} \\
 1696 \text{ product.} \\
 \hline
 (0)
 \end{array}$$

In the last operation, I place 4 in the root, and like-
 wise in the divisor 42, which makes the new divisor
 424, to the resolvend 1696 ; which divisor multiplied
 by 4, the figure placed in the root, produces 1696 ;
 equal with the dividend or resolvend aforesaid, as in
 the operation may be seen. Therefore square root of
 45796 is 214 ; for 214 multiplied into itself, produces
 45796, the number whose square root was sought.

Example 2.

What is the square root of 12299049 (3507 the root

$$\begin{array}{r}
 12299049 \\
 9 \\
 \hline
 1^{\text{st}} \text{ divisor, } 65) 329 \text{ resolvend.} \\
 325 \text{ product.} \\
 \hline
 2^{\text{d}} \text{ divisor } 700) 490 \text{ resolvend.} \\
 000 \text{ product.}
 \end{array}$$

$$\begin{array}{r} 3d \text{ divisor } 7007) \ 49049 \text{ resolvend.} \\ \underline{49049} \\ (0) \end{array}$$

Example 3. performed decimally.

$$160,000000 \text{ (12,649 root.}$$

I

$$\begin{array}{r} 1st \text{ divisor } 22) \ 060 \\ \underline{44} \end{array}$$

$$\begin{array}{r} 2d \text{ divisor } 146) \ 1600 \\ \underline{1476} \end{array}$$

$$\begin{array}{r} 3d \text{ divisor } 2524) \ 12400 \\ \underline{10096} \end{array}$$

$$\begin{array}{r} 4th \text{ divisor } 25289) \ 230400 \\ \underline{227601} \end{array}$$

2799

Note, That when the divisor cannot be had in the resolvend, then place a cipher in the quotient, and also on the right of the divisor, and then bring down the next square, &c. as in the second example above may be seen.

Note further, If any remainder happen to be after extraction, you may proceed by annexing pairs of ciphers to the left of the given number, and so come to what exactness you please.

Note also, Such numbers given for extraction that leave remainders, are by some called irrational, because their roots cannot be exactly discovered, but still there will something remain, though you work by whole numbers or fractions; as in the example above, where the remainder is 2799.

The extraction of the cube root.

TO extract the cube root of any number, is to find another number, which multiplied by itself, and that product by the number found, produces the number given for extraction.

AN

All single cube numbers, with their respective roots, are contained in the following table.

| | | | | | | | | | |
|---------------|---|---|----|----|-----|-----|-----|-----|-----|
| <i>Roots.</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| <i>Cubes.</i> | 1 | 8 | 27 | 64 | 125 | 216 | 343 | 512 | 729 |

1st, To prepare any number for extraction, make a point over units, and so successively over every third figure toward the left hand, in integers, missing two between each point; but in decimals you must from the place of units to the right hand, &c.

Example.

Extract the cube root of 46656, prepared thus, as above directed.

46656̇

Here are but two points, therefore the root will have but two places.

2^{dly}, The number being prepared, seek in the foregoing table the nearest root to the first point or period 46, which you will find to be 3, which place in the quotient thus, 46656̇(3; the cube whereof is 27, which place under your first period 46, as in the margin; subtract it from 46, and there rests 19; this is your first work, and no more to be repeated. Then to the remainder 19, bring down the next period, viz. 656, (which is the last), and place it on the right of the remainder 19.

46656̇ (3
27

19656̇ resolvend.

Then draw a line under the resolvend; next square the 3 placed in the quotient, which makes 9, which multiplied by 300 makes 2700 for a divisor, which place accordingly thus:

46656̇ (3
27

2700) 19656̇

Then seek how often 2 in 19? *Answer*, but 6 times, because of the increase that will come from the quotient;

tient: and place 6 in the quotient; then multiply the divisor by 6, and the product will be 16200; which place orderly under the resolvend, thus:

$$\begin{array}{r} 46656 \text{ (36)} \\ 27 \\ \hline 19656 \\ \hline 16200 \end{array}$$

Then proceed to find the increase coming from the quotient thus: square your last figure 6, and it makes 36; which multiplied by 3, the other figure of the quotient, it gives 108; which multiplied by 30, makes 3240. This place also orderly under the last number before set down, viz. 16200, and the work will appear thus:

$$\begin{array}{r} 46656 \text{ (36)} \\ 27 \\ \hline 2700) 19656 \\ \hline 16200 \\ 3240 \end{array}$$

Then cube the figure last placed in the quotient, viz. 6, and it makes 216; which place orderly likewise under the line 3240; add the three lines together, and they make 19656; which is equal to the resolvend above, viz. 19656; and there being no more periods to bring down, I see the work is finished, and find the cube root of 46656 to be 36.

This will appear to be true, if the root 36 be multiplied by 36, and that product by 36 again, for then the result will be 46656, as in the following operation.

$$\begin{array}{r} 36 \\ 36 \\ \hline 216 \\ 108 \\ \hline 1296 \\ 36 \\ \hline 7776 \\ 3888 \\ \hline 46656 \text{ proof.} \end{array}$$

Some

Some uses of the square and cube roots.

- 1.
- To find a mean proportional between two numbers.*

Rule. **T**HE square root of the product of the given numbers is the mean proportional sought; so the mean proportional between 16 and 64, will be 32, for 16 multiplied by 64 produces 1024, and the square of 32 is also 1024. This is of use in finding the side of a square equal to any parallelogram, rhombus, rhomboides, triangle, or regular polygon.

- 2.
- To find the side of a square equal to the area of a given superficies.*

Rule. The square root of the content of any given superficies is the side of the square.—So if the content of a given circle be 160, the side of the square equal will be 12,649.

- 3.
- The area of a circle being given, to find the circumference.*
- See page 220.

- 4.
- The area of a circle being given, to find the diameter.*
- See page 220.

- 5.
- Any two sides of a right-angled triangle being given, to find the third side.*

This depends upon a mathematical proposition, in which it is proved, that the square of the hypotenuse, or longest side of a right-angled triangle, is equal to the sum of the squares of the base and perpendicular; that is, of the other two sides.

See figure 13.

Case 1. Let the base or ground BA represent the breadth of a moat or ditch, and the perpendicular BC the height of a castle, tower, or city-wall; and the hypotenuse AC , the length of a scaling ladder.

In this figure, the base AB is supposed to contain 40 yards; and the perpendicular or height of the tower or wall, 30 yards; what length will the hypotenuse AC , or the scaling ladder, be?

Rule. The square root of the sum of the squares of the base and perpendicular, is the length of the hypotenuse. *See the work.*

1600 the square of the base 40.

900 the square of the perpendicular 30.

The sum 2500 (50 yards the root or length of the scaling ladder.

25

(0)

Case 2. If the length of the base, or breadth of the ditch were required; then the square root of the difference of the squares of the hypotenuse and perpendicular is the length of the base, or breadth of the ditch or moat. *See the work.*

2500 the square of the hypoten. *AC.*

900 the square of the perpend. *BC.*

The differ. 1600 (40 yards the root or breadth of the ditch.

16

(0)

Case 3. If the height of the tower or perpendicular *BC* were required; then the square root of the difference of the squares of the hypotenuse and base, is the height of the perpendicular *BC.*

6. Any number of men being given to be formed into a square battalia, to find the number of rank and file.

Rule. The square root of the number of men given will be the number of men to be placed in rank and file.

Example. Admit an army of 32400 men were to be formed into a square battalia; the square root of 32400 will be found to be 180: and so many men must be placed in rank, and also in file.

7. To find the side of a square, polygon, or the diameter of a circle, which shall be to any other given square, similar polygon, or circle, in a given proportion.

Rule. Since like surfaces are to each other, in a duplicate proportion of their like sides; therefore,

As

As the given circle, square, or polygon,
Is to the required circle, square, or polygon;
So is the square of the diameter or side of the first
To the square of the diameter or side of the second.
Then the square root of the result of the above proportion will be the diameter or side required.

Example 1. There is a circle whose diameter is 11; what will the diameter of that circle be, whose area is 4 times the area thereof?

Here 11 times 11 is 121; and

As 1—4 :: —121

$$\begin{array}{r} 4 \\ \hline 484 \text{ (22 the answer.)} \\ 4 \\ \hline 42 \overline{) 84} \\ 84 \end{array}$$

Example 2. There are two similar polygons whose areas are as 9 to 25, and the side of the lesser is 12 yards; what is the side of the greater? Here 12 times 12 is 144; and

As 9—25—144

$$\begin{array}{r} 25 \\ \hline 720 \\ 288 \\ \hline 9 \overline{) 3600} \\ \hline 400 \text{ (20 the answer.)} \\ 4 \\ \hline 000 \end{array}$$

8. *The uses of the cube root are to find out the dimensions of like solids, as globes, cylinders, cubes, &c.*

Rule. Since like solids are to each other, as the cubes of their like sides or diameters; therefore,
As the content or weight of a given solid,
To the content or weight of another like solid;

So is the cube of the side or diameter of the one,
To the cube of the side or diameter of the other.
Then the cube root of the result will be the length of
the side or diameter required.

Example 1.

If a bullet that weighs 72 lb. is 8 inches in diameter;
what will be the diameter of that bullet that
weighs 9 lb.?

Here the cube of 8 is 512; and

$$\begin{array}{r} \text{As } 72 \text{ --- } 9 \text{ --- } 512 \\ \quad \quad \quad 9 \\ \hline 72) 4608 \text{ (64} \\ \quad 432 \\ \hline \quad \quad 288 \\ \quad \quad 288 \\ \hline \end{array}$$

Then the cube root of 64, viz. 4, is the diameter required.

Example 2.

If a ship of 100 tuns be 44 feet long at the keel, of
what length must the keel of a ship be that carries
220 tuns?

Say, as 100 is to 220; so is the cube of 44, viz.
85184 to 187404.8; whose cube root is 57.226, the
length of the keel sought.

Example 3.

There is a cubical vessel whose side is 12 inches, and
it is required to find the side of a vessel that holds
three times as much. Here the cube of 12 is 1728,
which multiplied by _____ 3

produces _____ 5184

the cube root of which is 17.386, the answer required,
the side sought.

An easy rule to find the length of the masts of a ship, viz.

Two thirds the length of the keel, and the breadth
of the beam, is the length of the main-mast; and the
same is therefore, to multiply the length of the keel by

Y

2,

2, and to divide the product by 3, and then to the quotient add the breadth of the beam, and the total is the length of the main-mast.

Example 1.

Suppose a ship to be 108 feet by the keel, and 40 feet by the beam, what is the length of her main-mast?

$$\begin{array}{r} 108 \\ 2 \\ \hline 3) 216 \end{array}$$

Add $\left\{ \begin{array}{l} 72 \text{ two thirds of the keel.} \\ 40 \text{ the breadth of the beam.} \end{array} \right.$

112

Answer. The length of the main-mast is 112 feet, as in the work.

Again,

Admit a ship to be 84 feet by the keel, and 31 feet by the beam, what is the length of her main-mast?

84 per keel.

$$\begin{array}{r} 84 \\ 2 \\ \hline 3) 168 \end{array}$$

Add $\left\{ \begin{array}{l} 56 \text{ two thirds of the keel.} \\ 31 \text{ the breadth of the beam.} \end{array} \right.$

Answer, 87 feet the length of the main-mast.

Another way to find the length and thickness of masts and yards, viz.

The way to find the length of the main-mast, is to add the breadth of the beam, and the depth of the hold in feet together, and divide the total by 1,5, and the quotient will be the length of the main-mast in yards.

Example.

Admit a ship whose keel in length is 73 feet, and the breadth of the beam 28,5 feet, and the depth of the hold 12 feet; what is the length of the main-mast?

Feet

Feet.

28,5 breadth of the beam.

12,0 depth of the hold.

1,5) 40,5 (27 yards, *Answer.*

30

105

105

(0)

Answer, 27 yards, or 81 feet, as per work.

To find the thickness of the mast, having the length, say, by the rule of proportion, (or rule of three), if 84 feet long require 28 inches thick, what 81 feet long? as in the following work.

F. I. In. thick. F. I.

If 84 ——— 28 ——— 81

81

28

224

84) 2268 (27 inches thick, *Answer.*

168.

588

588

(0)

The construction of some useful geometrical problems.

At a given point near the middle of a right line given to erect a perpendicular. See figure 14.

ET *CD* be the line given; to have a perpendicular erected on it from the point *B*; with the compasses (opened at a convenient distance) place one foot at the point *B*, and with the other make the two marks *E* and *F*, on either side of *B*; then, having the same, or any other more convenient distance in

the compasses, set one point on E , and with the other describe the arch GG ; which being done, without altering the distance last used, set one foot at F , and with the other describe the arc HH , crossing the former at the point A ; through which intersection with a ruler draw a line from A to B , which will be perpendicular to the line CD .

2. *How to raise a perpendicular at or near the end of a line.*

This is effectual several ways; but I shall instance only two, which are very easy. See figure 15.

First method.

Suppose the line AB be given to raise a perpendicular near the end A .

First, open your compasses to any convenient distance, and set one foot on the point A , and with the other describe the arch FED ; then, with one foot of the compasses in D , (they retaining the same distance), cross the arch in E ; and then setting one foot in E , with the other make the arch AFG , crossing the first arch in F . Again, set one foot in F , and with the other describe the small arch HH , crossing the former in the point C : so the line AC being drawn, will be the perpendicular required.

The second method.

Admit B be the point given on which to draw the perpendicular BI . Open the compasses to any convenient distance; and setting one foot on the point B , pitch down the other foot at random, as suppose at K ; then the foot resting in K , turn the other about till it cross the line AB in L ; then draw the line KL and continue the same, beyond K , setting off the same distance KL (at which the compasses already stand from K to M); so a line drawn from B , through M will be the perpendicular required.

3. *How to divide a right line into two equal parts.* See figure 16.

Suppose the line AB be given to be divided into two equal parts. Take in the compasses any distance

above half the length of AB , and setting one foot on the point A , with the other draw the arch FDE ; then (with the compasses unaltered) set one foot in B , and with the other cross the former arch both above and below the line, in the points F and G ; then a line drawn from F to G shall intersect, or cut the given line in H , and divide the line AB into equal parts, AH and HB .

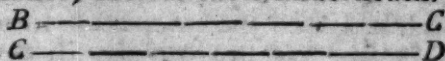
4. A line being given, how to draw another line parallel thereunto, at any distance required, or through any point assigned.

Of parallel lines there are two sorts, viz. straight or circular. All circles drawn on the same centre, whether greater or lesser one than the other, are said to be parallel or concentric, that is, having one common centre. See figure 17.

In this figure, the circle $ABCD$ is concentric, or parallel to the circle $EFGH$, because both of them are drawn from the same centre. The line AC is the diameter of the greater circle, and the line EG of the lesser circle. And all right lines drawn from the centre to either of the circumferences, are equal with respect to their periphery; and such lines are called half diameters, and sometimes the radius of the circle, and will divide the circle into 6 equal parts, each containing 60 degrees, and the whole circle 360; into which all the great circles of the sphere are supposed to be divided.

Of parallel right lines.

Right lined parallels, are lines drawn on a plane of equal length and distance; and though infinitely extended will never meet, and in all parts retain an equal distance, such as these underneath.



To draw a right line parallel to another right line at a distance given. See figure 18.

Take in your compasses the given distance GH , then setting one foot in E , draw the arc IK ; then moving to F , describe the arc LM ; then laying a ruler on the top of the two arcs, just touching them, draw

draw the line NO , which will be parallel to the given line EF .

5. *Through any three points (not in a straight line) to describe a circle.* See figure 19.

Let the three points given be A , B and C , through which it is required that a circle be drawn. First, set one foot of the compasses in one of the given points, as suppose in A , and extend the other foot to B , another of the points, and draw the arc of a circle GFD ; then (the compasses not altered) set one foot in B , and with the other cross the said arc with two small arcs, in the points D and E ; and draw the line DE . Thirdly, set one foot in C , (the compasses being at the same distance), and with the other foot cross the first arc GFD in the points of F and G , and draw the line FC , crossing the line DE in the point O , which is the centre sought for; in which, place one foot of the compasses, and describe the circle at the distance OA , and it will pass through all the given points, A , B and C .

How to make a line of chords geometrically to any assigned length or radius.

Since in the art of dialling, there is frequent use made of the line of chords, it is proper here to show the making thereof.

A line of chords is 90 degrees of the arc of a circle transferred from the limb of a circle to a straight line; now every circle, whether great or small, is divided (or supposed so to be) into 360 equal parts, called degrees: so the semi or half circle contains 180, the quadrant or quarter 90, and the radius or semi diameter (which is that line with which the circle or semicircle is drawn or described) is always equal to 60 degrees of that circle which it describes, and therefore 60 degrees of a line of chords is called the radius thereof.

To make the line of chords; as in figure 20.

First, draw a line of any length, as GBD , and at the middle thereof erect the perpendicular AB . Next open your compasses to the radius or length that you would have your line of chords be of; which admit it to be 60, and with that distance on B as the centre, describe

draw the semicircle CAD , which is divided into two equal parts or quadrants by the perpendicular line AB . Thirdly, divide the arc or quadrant AD , into 90 equal parts or degrees; which is done by taking the length of the line AB , and setting that distance on the quadrant AD , and from D to R ; so is DR 60 degrees, and AR 30 degrees; then take the distance AR , and set it from D to S , so is the quadrant divided into three equal parts, at the point S and R , each containing 30 degrees; this done, divide the several spaces between AR , RS , and SD , into three equal parts, each of which will be 10 degrees, according as the numbers are seen and set apart to them: and these again divided into two equal parts, each part contains five degrees, and every one of those into five smaller, as in the representation; and so the whole quadrant is divided into 90 degrees. Fourthly, the quadrant $ARSD$ being thus divided into 90 degrees, set one foot of the compasses in D , and open the foot to A , and describe the arch AEF , touching the line CD in F , so is the point F , upon the right line CD , the chord of 90 degrees. Fifthly, open the compasses from D to 80 degrees, and describe the arc $80 GH$; so shall the point H be the chord of 80 degrees. Sixthly, open the compasses from D to 70, describe the arc $70 IK$, so is K the chord of 70 degrees. Again, open the compasses from D to R , the radius, or 60 degrees, and describe the arc RLB , so is B the chord of 60 degrees equal to the radius. Do the same by 50, 40, 30, 20, and 10, and then you will have the line DF divided into 90 unequal parts, called chords, as in figure 20.

Thus much for the line of chords frequently made use of in dialling, where there is not the convenience of having a mathematical instrument-maker near at hand.

Note, A degree is the 360th part of the globe, or of any circle: each of which degrees is supposed to be divided into 60 parts, called minutes; so that 45 minutes is three quarters of a degree, and 30 minutes half a degree, and 15 minutes one quarter of a degree.

Instrumental arithmetic.

AS problems or questions in measurement, &c. are solved or answered arithmetically by the pen, so are they also instrumentally taken by compasses from

from certain lines, &c. or rules made for that purpose, for the help of those that are deficient in arithmetic, or for a quicker dispatch of business; and such performances are called *Instrumental arithmetic*; and of these instruments, the most in vogue or use are these three: 1. The carpenter's plain rule. 2. Gunter's line. 3. Coggeshal's sliding rule.

1. *The carpenter's plain rule.*

I shall describe and say something of the *carpenter's plain rule*, in relation to its uses, &c.

Its description.

This rule is made use of in measuring board and timber, being two feet in length, and divided into twenty-four parts or inches, and every one of those parts or inches subdivided into half-inches, and each of those halves into quarters, and each quarter into two parts; so that every inch is divided into eight parts, and the whole length into 192 parts.

This rule is well known, and therefore not absolutely necessary of representation; but however, for the better understanding it I shall give one, thus:

Under broad measure
thus described.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 1 | 7 |
| 2 | 6 | 4 | 3 | 2 | 2 | | |
| 0 | 0 | 0 | 0 | 4 | 0 | | |

This line begins at 6, and goes on to 36, within 4 inches of the rule on the right hand.

Its use.

| <i>In deep.</i> | <i>Feet In. pts.</i> | |
|-----------------|----------------------|------------------------------------|
| { 1 | 12 0 0 | } in length make a foot square. |
| { 2 | 6 0 0 | |
| { 3 | 4 0 0 | |
| { 4 | 3 0 0 | |
| { 5 | 2 4 9 | |
| { 6 | 2 0 0 | |

By this table it is manifest, and easily understood that a board of four inches requires 3 feet in length to make a foot square, and a piece of three inches

broad will require 4 feet in length to make a foot square, &c.

At the other end of this rule is a table called *under timber measure*; and thus described.

| | | | | | | | | | |
|-----|----|----|---|---|---|----|---|--|--|
| 1 | 1 | 3 | 4 | 5 | 6 | 7 | 8 | | |
| 144 | 36 | 16 | 9 | 5 | 4 | 2 | 2 | | |
| 0 | 0 | 0 | 0 | 9 | 0 | 11 | 3 | | |

This line begins at 8 and half, and goes on (by divisions) to 36.

| | In. square. | Foot. | |
|----------------------------|-------------|--------|---------------------------------|
| If a piece of timber of | 1 | 144, 0 | in length make a solid foot. |
| | 2 | 36, 0 | |
| | 3 | 16, 0 | |
| | 4 | 9, 0 | |
| | 5 | 5, 9 | |
| | 6 | 4, 0 | |
| | 7 | 2, 11 | |
| | 8 | 2, 3 | |

By this table it is plain, that if a piece of timber is 6 inches square, then 4 feet in length of that piece will make a solid foot.

It is a common method with carpenters to add the breadth and thickness of a piece of timber in inches together, and call the half thereof the side of the square of that piece; but this method gives the content more than it is: and the greater the difference, the larger the error. But the true square may be found in Gunter's line, thus: place one point of the compasses upon the line at the thickness, and the other at the breadth, then half of that extent will reach from either the breadth or thickness to the side of the true square in inches.

2. Gunter's line.

This line is commonly set on the carpenter's plain rule, and consists of two lines, numbered 1, 2, 3, &c. one set at the end of the other, and it is somewhat of the following form. See the line, tab. 2. fig. 2.

To

To prove the line by the compasses, observe that the

| | | | | | | | |
|------------------|---|---------|-------------|--------------|---|-------|--------|
| Distance from | { | 1 to 2 | is equal to | 2 to 4 | } | } &c. | |
| | | 5 to 10 | | the distance | | | 4 to 8 |
| | | 4 to 8 | | from | | | 3 to 6 |

To number on the Gunter's line.

Observe that the figures 1, 2, 3, 4, 5, 6, 7, 8, 9, sometimes signify themselves simply or alone; at other times, 10, 20, 30, 40, &c. Again, at other times, 100, 200, 300, or 1000, &c.

To find a number on the line, as suppose 134.

For the figure 1 account 1 on the line; and for 3 take 3 of the large divisions; and for 4 take 4 of the smaller divisions; and that is the point. Again, to find 750 on the line; for 7, take 7 on the line; for 50, take 5 of the great divisions, and that is the point.

To find a small number on the line, as suppose 12.

For 10, take one as before, and for 2 take 2 of the large divisions, and that is the point.

In measuring board or timber, it is best to have a line of 2 feet long, and compasses one foot long.

Note, Let the measurement be by the inch, foot, yard, pole, rod, &c. it is best to have it decimally divided, or so supposed, that is, into 10 parts.

Note also, That if one point of the compasses reach beyond the line in the work, remove the other point to the same figure or place on the other line.

Multiplication by Gunter's line.

To multiply 5 by 7, set one foot of the compasses on 1, in the left-hand line, and extend the other to 5 upwards, or towards the right hand, and with the same extent place one foot in 7, and the other foot will fall on 35 in the right-hand line, which is the answer.

Division by Gunter's line.

Example 1. Divide 63 by 3; extend from 3 to 1 downwards, or toward the left hand, and the extent will reach the same way from 63 to 21 the quotient.

N. B. In multiplying you must always extend upwards, that

that is, from 1 to 2, 3, 4, &c. and on the contrary, in dividing extend downwards.

Example 2. Divide 288 *l.* equally among 16 men : extend from 16 to 1 downwards ; and that extent will reach the same way, from 288 *l.* to 18 *l.* for each man.

Again,

Example 3. Suppose 750 *l.* were to be divided among 25 men ; extend from 25 to 1 downwards ; and that extent will reach the same way from 750 to 30 *l.* each man's share.

Rule of three direct.

Example 1. If 5 bushels of barley cost 11 shillings, what will 40 bushels cost ? Extend from 5 to 11, upwards ; and that extent will reach, the same way, from 40 to 88, the shillings required.

Example 2. If 3 ells of holland cost 10 *s.* 6 *d.* what will 40 ells cost ? Extend from 3 to 10 $\frac{1}{2}$ upwards ; and that extent, the same way, will reach from 40 to 140 *s.* the answer.

The use in board measure.

Example. If a board be nine inches broad, and 19 feet long, what is the content in superficial square feet ? Extend from 12 (the centre of foot-measure) to 9 downwards ; and that extent, the same way, will reach from 19 to 14 and $\frac{1}{4}$.

In timber measure.

Example. A piece of timber 24 inches square, and 12 feet long, what is the content in solid feet ? Extend from 12 the centre to 24 upwards ; and that extent will reach, the same way, will reach from 8 to 32 feet the content.

Brick work.

How many rods of work are there in 4085 feet ? Extended from 272 downwards to 2 ; and that extent, the same way, from 4085, will reach to 15 rods, the answer.

3. Coggeshal's sliding rule.

The next instrument I shall speak of, is that which is by the name of *Coggeshal's sliding rule*. And of

Its

Its description.

This rule is framed three ways ; sliding by one another as the glazier's rule ; sliding on one side of a two-foot joint-rule ; and one part sliding on the other, in a foot of length ; the back-part being flat, on which are fundry lines and scales.

Upon the aforesaid sliding side of the rule, are four lines of numbers, three are double lines, and one a single line of numbers marked with *A B C* and *D*, the three marked *A B* and *C*, are called double lines of numbers, and figured 1, 2, 3, 4, 5, 6, 7, 8, 9. Then 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 at the end. That marked *D*, is the single line of numbers, and figured 4, 5, 6, 7, 8, 9, 10, 20, 30, and at the end 40, even with and under 10, in the double line next to it, and that is called the girt line, and so marked in the figure.

The figures on the three double lines, of numbers, may be increased or decreased at pleasure ; thus 1 at the beginning may be called 10, 100, or 1000 ; the 2 is 20, 200, or 2000 ; so that when 1 at the beginning is 10, then 1 in the middle is 100, and 10 at the end is 1000 ; but if 1 at the beginning is counted for 1, then 1 in the middle is 10, and 10 at the end is 100.

And as the figures are altered, so must the strokes or divisions between them be altered in their value according to the number of the parts they are divided into ; as thus, from 1 to 2, it is divided into ten parts and each tenth is divided into 5 parts : and from 2 to 3, it is divided into 10 parts, and each tenth into 2 parts and so on from 3 to 5 ; then from 5 to 6, it is divided into 10 parts only ; and so on unto one in the middle of the rule, or the end of the first part of the double line of numbers. The second part of the double line is divided like the first.

The girt line marked *D*, is divided from 4 to 5 into 10 parts, and each tenth into 2 parts, and so on from 5 to 10 : and then from 10 to 20, it is divided into 10 parts, and each tenth into 4 parts ; and so on the way from 20 to 40 at the end, which is right against 10 at the end of the double line of numbers.

The lines on the back side of this rule that slides on one side, are these, *viz.* a line of the inch-measure from 1 to 12, each divided into halves, quarters, and

half-quarters; another line of inch-measure from 1 to 12, each divided into 12 equal parts, and a line of foot-measure, being one foot divided into 100 equal parts, and figured 10, 20, 30, 40, 50, 60, 70, 80, 90, and 100; even with 12 on inch measure.

And the back-side of the sliding piece is divided into inches, halves, quarters, and half quarters, and figured from 12 to 24, so that it may be slid out to 2 feet, to measure the length of a tree, or any thing else you have occasion to measure.

The use of the double scale.

Examples.

Suppose there is a geometrical square, whose sides are $3\frac{1}{2}$ feet each: set one foot on the line *B*, to $3\frac{1}{2}$ on the line *A*; and then against $3\frac{1}{2}$ on the line *B*, is $12\frac{1}{2}$ feet on the line *A*, which is the content of such a square.

F. Pts.

$$\begin{array}{r} 3-6 \\ 3-6 \\ \hline 10-6 \\ 1-9 \\ \hline 12-3 \end{array} \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \text{arithmetically.}$$

12-3 Proof.

Suppose the side of a rhombus to be 8 feet $6\frac{1}{4}$ inches, and the breadth or line *AB*, 8 F. $4\frac{1}{2}$, what is the content? Set 1 foot on the line *B*, to $8\frac{52}{100}$ feet on the line *A*, then against $8\frac{52}{100}$ feet on the line *B*, is 71 feet $\frac{40}{100}$ parts of a foot on the line *A*; and to know the value of the decimal, or part of the foot, look for $\frac{40}{100}$ on the rule, and you will find against it $4\frac{1}{2}$ inches, so that the content of this rhombus is 71 feet, $4\frac{1}{4}$ inches.

Again, Suppose the length of a rhomboides to be 17 F. 3, or $17\frac{25}{100}$, and the breadth 8 F. 7 or $8\frac{58}{100}$, what is the content? Set one foot on the line *B*, to 17,25 on the line *A*, then against 8,58 on the line *B*, is 148 feet on the line *A*. The figure hath been presented before, and operated arithmetically, therefore it is here unnecessary.

Let the base of a triangle be 4 feet $1\frac{3}{4}$ inch, and the perpendicular 2 feet $1\frac{3}{4}$: the half of the one is 2 feet 7 parts; and of the other 1 foot 7 parts. Set one on

the line *B*, to 4,15 on the line *A*; then against 1,07 half the perpendicular on the line *B*, is 4 feet and almost $\frac{1}{2}$ a foot for the content. Or if you set 1 on the line *B*, to 1,07 on the line *A*, against 4,15 on the line *B*, is 4, and almost $\frac{1}{2}$ a foot on the line *A*.

Again, another way. If you set one on the line *B*, to 4,1 on the line *A*, then against 2,15 on the line *B* is $8\frac{2}{10}$ feet (which is about 11 inches) on the line *A*, the half whereof is 4 feet $5\frac{1}{2}$ inches, which is the content of the triangle.

G E O G R A P H Y.

Geography is the art of describing the figure, magnitude, and position of the surface of the earth and seas, and their parts.

Many and sufficient arguments may be produced to prove, that the earth and seas are of a spherical or globular figure; one of them may be sufficient in this place, *viz.* that ships in sailing from high capes or headlands, lose sight of their lower parts first; and continue gradually to lose sight of those which are situated higher and higher, till at last the top vanishes; which could not be, unless the surface of the sea were convex: now, this convexity of the sea is found to be uniform in all parts thereof, therefore the surface of the waters is spherical; which being granted, that of the land must be nearly so, because its extremity sets limits to the waters.

The whole body of the earth and sea is therefore called the *Terraqueous globe*.

Since, as has been before observed, all circles are divided into 360 degrees, therefore any great circle surrounding the terraqueous globe, is usually so divided. Our ingenious countryman, Mr Richard Norwood, about the year 1635, by an accurate measurement of the distance between London and York, found that a degree of a great circle was about $69\frac{1}{2}$ statute-miles in length, and consequently, that the circumference of the terraqueous globe was 25020 miles; whence its diameter will be 7964 miles.

The sea covers the greater part of the terraqueous globe, out of which the land rises with very few ascents, the height of the loftiest mountains thereof being hardly the four thousandth part of the above

found diameter, which is but just sufficient to give the rivers a slow and easy descent.

Geographers have found it necessary to imagine certain circles to be drawn on the surface of the earth, for the better determination of the positions of places thereon.

These are either greater or lesser circles; great circles divide the globe into two equal parts, and lesser circles divide it into two unequal parts.

There are six kinds of great circles; two of them, viz. the equator or equinoctial, and the ecliptic, are fixed; but the others, viz. the meridians, the circles of longitude, the horizons, and the vertical circles, are variable, according to the part of the globe they are appropriated to.

There are two points on the surface of the terra-queous globe, called the *poles of the earth*, which are diametrically opposite to each other; the one is called the *north*, and the other the *south pole*.

The equator is that great circle which is equally distant from both the above-mentioned poles, and is so called from its dividing the terra-queous globe into two equal parts; named from the poles which are situated in each, the northern and southern hemispheres: it is also called equinoctial, because, when the sun enters it, the days and nights are of equal length in all parts of the globe: seamen commonly call this circle the *line*.

Meridians, or circles of terrestrial longitude, are supposed to be drawn perpendicular to the equator, and to pass through the poles; they are called meridians or mid-day circles, because when the sun comes to the meridian of any place, it is noon or mid-day at that place.

Hence every particular place on the surface of the terra-queous globe hath its proper meridian, and consequently a traveller, who doth not directly approach or recede from one of the poles, is continually changing his meridian.

With respect to the two circles above described, every place upon the earth is said to have its particular latitude and longitude.

The latitude of any place upon earth is its distance from the equator, in a direct line towards one of the poles; and since the meridians proceed in such direct

lines, therefore latitude is reckoned in degrees, and parts of degrees, on the meridian of the place.

The longitude of any place upon earth, is the east or west distance of the meridian of that place, from some fixed meridian, at which longitude is supposed to begin: now, since all the meridians pass through the poles they coincide with one another at those points, and their greatest distance from each other will be, when they are farthest from those points of coincidence, viz. at the equator; therefore longitude is reckoned in degrees, and parts of a degree, on the equator.

Geographers have differed very much in the meridian from whence they have assumed the beginning of a longitude; the ancients chose the meridian of the Canaries, which they called the *Fortunate Islands*, others have pitched on the islands of Azores, or the western islands; but the most usual way is, now, to reckon longitude, from the capital of that country in which an author writes; and accordingly the longitude is hereafter reckoned from the meridian of London.

Parallels of latitude are small circles drawn parallel to the equator at any assigned distance therefrom; therefore every particular place on the surface of the terraqueous globe hath its proper parallel of latitude.

There are four of these parallels of latitude, that are particularly remarkable, viz. the two tropics and the two polar circles; but for the better explanation of their properties, it will be necessary, first to define the ecliptic.

The ecliptic is that great circle in which the sun seems to perform its annual motion round the earth; this circle makes an angle with the equator of $23^{\circ} 29'$; it intersects in two opposite points, called the equinoctial points; and those two points in the ecliptic which are farthest from the equinoctial points are called the solstitial points.

The tropic of Cancer is a parallel of latitude $23^{\circ} 29'$ distant from the equator in the northern hemisphere, passing through the northern solstitial point of the ecliptic above described: and

The tropic of Capricorn is a parallel of latitude, as far distant in the southern hemisphere passing through the southern solstitial point.

The arctic polar circle is a parallel of latitude $23^{\circ} 29'$

29' distant from the north pole; and the antarctic polar circle is a parallel of latitude as far distant from the south pole.

The tropics and polar circles divide the globe into five parts called Zones, that is to say girdles or belts; one of them is called the Torrid; two, Temperate; and two, Frigid.

The torrid zone, so called from the great heat of the sun (which is vertical, or passes directly over the heads of the inhabitants twice in a year), is situated between the two tropics, and is therefore about 47 degrees in breadth; the inhabitants are called *Amphiscians*, that is, such as have their shadows cast both ways; the sun being seen at noon sometimes to the north, and at other times to the south of them.

The northern temperate zone is situated between the tropic of Cancer and the arctic polar circle; and the southern temperate zone, between the tropic of Capricorn and the antarctic polar circle; they are each of them about 43 degrees broad; the inhabitants are called *Heteroscians*, that is, such as have their shadow but one way; for at noon the shadows of the inhabitants of the northern temperate zone, are always cast northward; and those of the inhabitants of the southern, southward.

The frigid zones contain all that space between the polar circles and the poles themselves; the northern frigid zone, being surrounded by the arctic circle, and the southern by the antarctic, the inhabitants are called *Periscians*, because (when the sun is on the same side of the equator as those inhabitants are) their shadows are (in the space of 24 hours) cast of all sides, or quite round them. The sun does not set in the places within these zones, during several successive revolutions or days in the summer: and in the winter he doth not rise for a like space of time. At the poles themselves the sun is visible for half of the year, and invisible for the other half.

If any place on the globe (except the poles and equator) be particularly considered, there will be three other places on the same meridian, which have more immediately a relation thereto, viz. 1. That place which has the same latitude on the other side of the equator; the inhabitants of this place are called *Antipodes*.

iaci, or *Anteci*ans; they have mid-day and mid night at the same times with those of the place assumed, but the seasons of the year are different, the summer of the one being the winter of the other.

2. That place which is on the same parallel of latitude, but is 180 degrees different in longitude; the inhabitants of this place are called *Periaci* or *Perieci*ans; they have summer and winter at the same times with those of the place assumed, but the times of the day are different, the mid-day of the one being the mid-night of the other.

3. That place which has the same latitude on the other side of the equator, and is 180 degrees different in longitude; this place is diametrically opposite to the place assumed: its inhabitants are called *Antipodes*, and their seasons of the year, as well as times of the day, are totally opposites.

The horizon is that great circle which divides the upper or visible hemisphere of the world, from the lower or invisible; the eye of the spectator being always in the centre of his horizon. Hence every particular place on the terraqueous globe hath a different horizon; and consequently a traveller proceeding in any direction, is continually changing his horizon.

The circle is by mariners divided into four quarters, containing 90 degrees: the four points quartering this circle are called cardinal points, and are named, *east*, *west*, *north*, and *south*; the east and west are those points, on which the sun rises and sets when he is in the equinoctial; and the north and south points are those which coincide with the meridian of the place, and are directed toward the north and south poles of the world.

Each quarter of the horizon is farther divided into eight points, which are very necessary to the geographer, for the distinguishing the limits of countries; but the use of these divisions is much more considerable when applied to the *mariner's compass*.

Before the invention of this excellent and most useful instrument, it was usual in long voyages to sail by, or keep along the coast, or at least to have it in sight; as is manifest and plainly evident, by the voyages of St Paul, Acts xx. 13. and xxvii. 2.; which

made their voyages long, and very dangerous, by being so near the shore. But now, by the help of a needle, touched by the magnet or loadstone, which, by a wonderful and hidden quality, inclines its point always northerly, the ingenious mariner is directed in his proper course of sailing, through the vast ocean, and unfathomable depths, to his intended port: and if the wind is favourable, can sail near 333 leagues, or 1000 miles in a week, though in the darkest weather, or darkest night, when neither land, moon, or stars are to be seen; which before were the only guide; and, if not seen, the sailors were at great loss, and exposed to the most imminent danger.

Behold the figure or representation of the said compass, with the cardinal and other points as followeth. See tab. 2. fig. 3.

The above compass is a representation of the horizon on a circular piece of paper called a card; which card being properly fixed to a piece of steel called the needle, and placed so as to turn freely round a pin that supports it, will shew the position of the meridian and other points; and consequently, toward which of them the ship sails.

Note, The letters *NBE*, *NNE*, *NEBN*, &c. are to be read North by East, North North East, North East by North, &c.

A climate is a space of the terraqueous globe contained between two such parallels of latitude, that the length of the longest day in the one exceeds that in the other by half an hour.

There are sixty climates, thirty to the north, and thirty to the south of the equator; twenty-four of each thirty, being situate between the equator and the polar circles, differ in the length of their longest day by 24 hours; but in the remaining six, between the polar circles and poles, the differences of the lengths of the longest days are each a month.

A table of the climates, between the equator and the polar circles.

| Climate. | Longest Day. | Begins Latitude. | Ends Latitude. | Breadth. |
|----------|----------------------|---------------------|-------------------|----------|
| 1 | 12 $\frac{1}{2}$ Ho. | 0° : 0' | 8° : 34' | 8° : 34' |
| 2 | 13 | 8 : 4 | 16 : 43 | 8 : 09 |
| 3 | 13 $\frac{1}{2}$ | 16 : 43 | 24 : 11 | 7 : 28 |
| 4 | 14 | 24 : 11 | 30 : 45 | 6 : 34 |
| 5 | 14 $\frac{1}{2}$ | 30 : 45 | 36 : 30 | 5 : 45 |
| 6 | 15 | 36 : 30 | 41 : 22 | 4 : 52 |
| 7 | 15 $\frac{1}{2}$ | 41 : 22 | 45 : 31 | 4 : 09 |
| 8 | 16 | 45 : 31 | 49 : 01 | 3 : 30 |
| 9 | 16 $\frac{1}{2}$ | 49 : 01 | 51 : 58 | 2 : 57 |
| 10 | 17 | 51 : 58 | 54 : 29 | 2 : 31 |
| 11 | 17 $\frac{1}{2}$ | 54 : 29 | 56 : 37 | 2 : 08 |
| 12 | 18 | 56 : 37 | 58 : 26 | 1 : 49 |
| 13 | 18 $\frac{1}{2}$ | 58 : 26 | 59 : 59 | 1 : 33 |
| 14 | 19 | 59 : 59 | 61 : 18 | 1 : 19 |
| 15 | 19 $\frac{1}{2}$ | 61 : 18 | 62 : 25 | 1 : 07 |
| 16 | 20 | 62 : 25 | 63 : 21 | 0 : 56 |
| 17 | 20 $\frac{1}{2}$ | 63 : 21 | 64 : 09 | 0 : 48 |
| 18 | 21 | 64 : 09 | 64 : 49 | 0 : 40 |
| 19 | 21 $\frac{1}{2}$ | 64 : 49 | 65 : 21 | 0 : 32 |
| 20 | 22 | 65 : 21 | 65 : 45 | 0 : 24 |
| 21 | 22 $\frac{1}{2}$ | 65 : 45 | 66 : 06 | 0 : 21 |
| 22 | 23 | 66 : 06 | 66 : 20 | 0 : 14 |
| 23 | 23 $\frac{1}{2}$ | 66 : 20 | 66 : 28 | 0 : 08 |
| 03 | 24 | 66 : 28 | 66 : 31 | 0 : 03 |

A table of the climates between the polar circles and the poles.

| Climates. | Longest Day. | Begins Latitude. | Ends Latitude. | Breadth. |
|-----------|-----------------|---------------------|-------------------|----------|
| 25 | 1 Month | 66 : 31 | 67° : 21' | 0° : 50' |
| 26 | 2 | 67 : 21 | 69 : 48 | 2 : 27 |
| 27 | 3 | 69 : 48 | 73 : 37 | 3 : 49 |
| 28 | 4 | 73 : 37 | 78 : 30 | 4 : 53 |
| 29 | 5 | 78 : 30 | 84 : 05 | 5 : 35 |
| 30 | 6 | 84 : 05 | 90 : 00 | 5 : 55 |

The terraqueous globe, or globe of the earth and waters, is divided by nature, into continents, islands, peninsula's, isthmus's, mountains, promontaries or capes, hills and valleys; oceans, seas, lakes, gulfs or bays,

bays, straits, ports or harbours, and rivers; rocks, shelves, banks, marshes, and bogs.

A continent, called sometimes the main-land, is a large tract of land containing several contiguous countries, empires, kingdoms, or states.

An island is a piece of land wholly surrounded by the ocean, sea, or other water, and so divided from the continent.

A peninsula (that is to say, *almost an island*) is a piece of land compassed by water, except on one side, where it is joined to the continent or other land.

An isthmus is that neck or narrow piece of land that joins a peninsula to the continent.

A mountain is a part of the earth which is considerably higher or more elevated than other lands near it.

A promontory is a mountain running out into the sea, the extremity of which is called a cape or head-land.

A hill is a lesser kind of mountain; and a valley is that land which is situate at the bottom of a mountain or hill, or between two or more such.

The ocean is a vast body of salt water, which separates some of the continents, and washes their borders or shores.

A sea is a branch of the ocean flowing between some parts of the continents, or separating islands from them.

A lake is a body of waters every where surrounded by the land.

A gulf or bay is a part of the ocean or sea contained between two shores, and is encompassed by the land except on one side, where it communicates with the other waters.

A strait is a narrow passage whereby seas, gulfs, and bays, communicate with the ocean, or with one another.

A port or harbour is a part of the ocean or sea so inclosed by the land, that ships may ride in safety therein.

A river is a running water descending in a narrow channel from the mountains or other high lands, and emptying itself into some ocean, sea, lake, or other river.

Rocks are great stones; shelves and banks are eminences

nences consisting of stones, sands, or other matter which obstruct the passage of ships at sea, and often prove fatal to those who do not keep clear of them.

Marshes are lands lying low, which are liable to be overflowed by the sea or rivers : and bogs are mixtures of land and water, over or among which it is dangerous to attempt a passage.

The known parts of the earth are commonly divided into four parts, viz. Europe, Asia, Africa, and America ; the first three were known to the ancients, and are for that reason called the old world ; the fourth was discovered about 300 years ago, and is therefore called the new world.

The lands which lie toward the north and south poles are very little known ; that toward the north is called *Terra Arcticæ*, and that toward the south pole *Terra Antarcticæ*, or *Terra Australis incognita* ; the latter is supposed, by some, to be nearly as big as Europe, Asia, and Africa.

The ocean assumes different names, in different parts of the earth ; and the seas, gulfs, and bays, are named mostly, from the lands to which they adjoin : it is thought therefore most convenient, in this short sketch to describe the lands and waters together ; and first of

E U R O P E,

And the adjacent waters.

Europe is bounded, on the north, by the northern or frozen ocean ; on the west, by the north Atlantic or western ocean, which separates it from America ; on the south, by the Mediterranean sea, separating it from Africa ; and, on the east, by Asia, which it adjoins, without any visible limit, toward the northern parts ; but on the southern, the river Tanais, the Palus Mæotis, or sea Della Zabacche, the straits of Caffa, the Euxine, or Black sea, the straits of Constantinople, the sea of Marmara, the straits of Dardanel and the Archipelago, serve to separate them.

The dimensions of Europe may be partly conceived by the measures following : Constantinople, the capital of Turkey, (situate in latitude $41^{\circ} 00'$ N. longitude $28. 58$ E.) bears from Cape St Vincent, the south-west point of land in Portugal, (situate in

itude $36^{\circ} 41'$ N. long. $8. 12. W.$) N. $81, 40 E.$ being 1770 geographical miles * distant therefrom.

Cape Mala, the southern point of Turkey (in lat. $37^{\circ} 20'$ N. long. $24. 70. E.$) bears from the north cape (in lat. $71^{\circ} 27'$ N. long. $26. 30. E.$) S. $2. 15. W.$ distance 2058 miles.

Europe contains the following empires, kingdoms, regions, or states, viz. Spain, Portugal, France, Italy, Turkey, Great Britain, the Netherlands, Germany, Hungary, Poland, Denmark, Sweden, and Muscovy.

Of SPAIN and PORTUGAL.

Spain and Portugal are surrounded by the sea on three sides; on the south and south-east by the Mediterranean, which communicates with the western or Atlantic ocean by the straits of Gibraltar; on the west, by the said ocean; and on the north, by the same, or a part thereof, called the Bay of Biscay on the north-east, by the Pyrenian mountains, which reaching from the Mediterranean to the Bay of Biscay separate it from France.

Portugal is now a kingdom separate from Spain, to which it was heretofore subject; it is situate on the ocean, which washes it on the west and south; it has Galicia on the north; and borders upon Leon, Old Castile, New Castile, and Andalusia on the west; it is hardly 300 miles in length from north to south, and about 100 in breadth. The capital city is Lisbon, which is now in a ruinous condition, being almost totally destroyed by an earthquake and a fire which succeeded it in November 1755. The city of Oporto is so a place of great trade.

Most of the other provinces of Spain were also formerly separate kingdoms; such were Andalusia, in which Gibraltar is situated, as are the cities of Seville and Cadiz; Granada within the straits, the principal city has the same name; and on the Mediterranean are situated the ports of Malaga and Almeria; Murcia more eastward in the Mediterranean, in which, beside a city of the same name, is the city and port of Carthage: Valencia, north eastward of Murcia;

Geographical miles may be reduced to English miles, by adding their number one sixth of the same; thus 1700 geographical miles equal to 1700 and $283, \text{ or } 1983$ English miles.

this

this has a city and sea-port of the same name, and another port of great trade called Alicant.

In the inland parts are the kingdoms of Old Castile, New Castile, and Leon; and near the confines of France, those of Arragon and Navarre; the principal cities of Old Castile are Burgos and Valladolid; of New Castile, Madrid, the king's residence, and Toledo; of Leon, Salamanca and Leon; of Arragon, Saragossa; and of Navarre, Pampelona and Estella.

The kingdom of Galicia is situate on the ocean in the north-west part of Spain; its principal cities are Compostella, and Corunna, or the Groyne, which is a sea-port; the principality of Asturias gives title to the king of Spain's eldest son; it is situate eastward on the bay of Biscay, the principal city is called Oviedo; the province of Biscay, still more eastward, lies on the bay of that name, and has two ports of consequence, Bilbao and St Sebastian.

Lastly, The principality of Catalonia is situated on the Mediterranean, and is the most eastern province of Spain; in this is the city and port of Barcelona, which is not inferior to any of the above named. Not far from which are the Balearic isles, called Majorca, Minorca, and Ilica.

Proceeding eastward along the Mediterranean sea is the kingdom of France, which is bounded on the east by Italy and Germany, on the north by the Netherlands and the English channel, on the west by the bay of Biscay, and to the south of the Pyrenees, which separate it from Spain, and a part of the Mediterranean sea.

France consists of twelve provinces; the southern are Guienne and Gascony, whose chief town is Bourdeaux; Languedoc, whose capital is Tholouse; Dauphiny, whose principal city is Grenoble; and Provence whose capital is Aix; this province has two very considerable sea-ports, called Toulon and Marseilles.

More northerly are the provinces of Bretagne, Orleans, Bourgoigne, and Lionois, whose capitals are Rennes, Orleans, Dijon, and Lions; and still more northward are Normandy, the isle of France, Champagne, and Picardy, whose chief towns are Rouen, Paris, (the capital of the kingdom), Troyes, and Amiens.

Although the provinces of France have not the superb titles of kingdoms as those of Spain have, yet four

of them are more extensive, rich, and populous, than some of those kingdoms.

Italy is divided from France on the west by the river Var, and part of the Alps; from Germany on the north by the same mountains called the Alps; and is every where else surrounded by the Mediterranean sea, and the gulf of Venice, which is a branch thereof.

This country is divided into a great many territories governed in different manners.

The dukedom of Savoy situated partly among the Alps, the capital of which is Chamberry; and the principality of Piedmont, whose capital is Turin, are subject to the king of Sardinia; the duchies of Milan and Mantua, whose capitals bear the same names, are subject to the queen of Hungary; the duchy of Montferat, whose capital is called Casal, and those of Parma and Modena, having capitals of the same name, are governed by their own dukes; Venice, Genoa, Lucca, and St Marino, are the capitals of four republics, called by those names; Trent is governed by its bishop; Rome and its dependencies by the pope; the grand duchy of Tuscany (the capital of which is Florence) is subject to the present Emperor of Germany; and Naples, the capital of a kingdom, situated at the southern extremity, together with the island of Sicily, from which it is divided by a narrow strait, are subject to the same king. The chief city of Sicily is called Palermo.

There are two other large islands, Sardinia (whose capital is Cagliari) subject to its king, and Corsica (whose capital is Bastia) subject to the republic of Genoa; also a small one to the south of Sicily called Malta, subject to the knights of Malta.

More to the eastward is Turkey in Europe, which consists of many provinces; Constantinople in the eastern part thereof being the residence of the Grand Seignior, the sovereign of this empire.

The names of those provinces, and their capital cities, follow.

Provinces.

Dalmatia,
Bosnia,
Servia,
Transylvania,

Chief cities.

Spalatro,
Belgrade,
Semandria,
Hermanstat,

A a

Provinces.

Provinces.

Valachia,
Moldavia,
Bulgaria,
Crim Tartary,
Romania,
Grecia.

Chief cities.

Tergowick,
Saczow,
Sophia,
Precop,
Constantinople,
Saloniki.

To these must be added the islands of the Archipelago, which are very numerous.

Great Britain is a large island, having divers lesser ones dependent on it; it consisted a few years ago of two distinct kingdoms, (under one sovereign), called England and Scotland; and, as this work is published in the former of them, it is thought convenient to be more particular in the description thereof, than we are with regard to other countries; we shall therefore give the following

Account of the several counties of England and Wales with their produce, market-towns, and market-days, &c.

Note, *m* stands for Monday, *tu* for Tuesday, *w* for Wednesday, *th* for Thursday, *f* for Friday, *s* for Saturday.

Berkshire

IS supposed to contain about 527,000 acres, is 120 miles in circumference; hath plenty of corn, cattle, wool, and wood, (especially oak), and is accommodated with water-carriage, by the very fine rivers of Thames and Kennet;

And hath these market-towns, viz.

| | |
|---|-----------------------|
| Reading, the shire-town, market-day on Saturday | |
| Abingdon, <i>m</i> and <i>f</i> | Newberry, <i>th</i> |
| Windsof, <i>f</i> | Farrington, <i>tu</i> |
| Wallingford, <i>tu</i> and <i>f</i> | Wantage, <i>f</i> |
| Maidenhead, <i>w</i> | East-Isley, <i>w</i> |
| Hungerford, <i>w</i> | Oakingham, <i>th</i> |

Buckinghamshire

Is an inland county as well as Berkshire; it contains about 441,000 acres, is 138 miles in circumference, abounds in corn and cattle, and is very considerable for wool. The principal rivers in this shire are Tame, Ouze, and Coln.

Mar

Market-towns.

| | |
|---------------------------|---------------------------|
| Buckingham, <i>f</i> | Wendover, <i>th</i> |
| Aylesbury, <i>f</i> | Amerham, <i>tu</i> |
| High-Wickham, <i>f</i> | New-port Pagnel, <i>f</i> |
| Marlow, <i>f</i> | Colebrook, <i>w</i> |
| Stony-Stratford, <i>f</i> | Risborough, <i>f</i> |
| Oundle, <i>m</i> | Invingho, <i>f</i> |
| Beaconsfield, <i>th</i> | Winslow, <i>th</i> |
| Cheshham, <i>w</i> | |

Bedfordshire

Contains about 260,000 acres, is 73 miles in circumference, well stored with corn and cattle, and famous for fuller's earth, &c.

Market-towns.

| | |
|---------------------------------|------------------------|
| Bedford, <i>th</i> and <i>f</i> | Luton, <i>m</i> |
| Dunstable, <i>w</i> | Shefford, <i>f</i> |
| Wooburn, <i>f</i> | Biggleswade, <i>th</i> |
| Amptonhill, <i>th</i> | Potton, <i>f</i> |
| Leighton, <i>m</i> | Tuddington, <i>f</i> |

Cambridgeshire

Is an inland county, contains about 570,000 acres, is 130 miles in circumference, and affords plenty of corn, cattle, and wild fowl. Cambridge is the shire-town, and remarkable for a famous university, containing 12 colleges, and 4 halls, all well-endowed, and are as followeth, viz.

When founded. Colleges.

By whom founded.

| | |
|------------------------|--|
| 1284 Peter house, | —by Hugh de Batham, Bp of Ely. |
| 1346 Corpus Christi, | } by Henry of Monmouth, Duke of Lancaster. |
| or Bennet, | |
| 1348 Gonvil and Caius, | so called from its sev. founders. |
| 1441 King's | —by King Henry VI. |
| 1448 Queen's | —by Margaret his queen. |
| 1497 Jesus | —by J. Alcocke, L. L. D. Bp of Ely. |
| 1506 Christ's | } by Margaret Countess of Richmond. |
| 1506 St John's | |
| 1542 Magdalen | —by Ed. Stafford, D. of Buckingham. |
| 1546 Trinity | —by King Henry VIII. |
| 1584 Emmanuel | —by Sir Walter Mildmay. |
| 1593 Sidney Sussex | —by Frances Sidney Countess of Sussex. |

Halls.

- 1343 Clare——by Richard Badew.
 1347 Pembroke —by Mary Countess of Pembroke.
 1353 Trinity ——by W. Bateman Bp of Norwich.
 1549 Catharine —by Robert Wood the chancellor.

Market-towns.

| | |
|-----------------------|-------------------|
| Cambridge, <i>f</i> | Merche, <i>f</i> |
| Ely, <i>tu</i> | Wisbich, <i>f</i> |
| Caxton, <i>tu</i> | Roylton, <i>w</i> |
| Linton, <i>th</i> | Soham, <i>f</i> |
| New-market, <i>tu</i> | |

Cheshire

Is a maritime or sea county, containing 720,000 acres, and is in circumference about 118 miles. Cheese and salt are the principal commodities: for the first, no place in the world equals it; and for the latter, if there was but a sufficient quantity, there would be no occasion for voyages to the Isle of May.

Market towns.

| | |
|--------------------------------|-----------------------|
| Chester, <i>w</i> and <i>f</i> | Frodsham, <i>w</i> |
| Congleton, <i>f</i> | Stockport, <i>f</i> |
| Namptwich, <i>f</i> | Sandwich, <i>th</i> |
| Middlewich, <i>f</i> | Astringham, <i>tu</i> |
| Norwich, <i>f</i> | Malpas, <i>m</i> |
| Macclesfield, <i>m</i> | Knotsford, <i>f</i> |

Cornwall

Is a maritime county in the most western part of the kingdom, containing about 960,000 acres, and is 150 miles in circumference. The chiefest commodities are tin and copper, particularly the former; it also affords great plenty of wild fowl, especially woodcocks in the season; it likewise yields great quantities of samphire, eringo, fine slate, and marble; above all the rest, vast quantities of fish, which are yearly exported to France, Spain, and other foreign countries.

Market-towns.

| | |
|-----------------------------------|--------------------------------|
| Launceston the ch. town, <i>f</i> | Padstow, <i>f</i> |
| Leskard, <i>f</i> | Cachelford, <i>f</i> |
| Lestwithiel, <i>f</i> | Grampond, <i>f</i> |
| Truro, <i>w</i> and <i>f</i> | Penryn, <i>w, f, and f</i> |
| Bodmin, <i>f</i> | Tregony, <i>f</i> |
| Helston, <i>f</i> | St Ives, <i>w</i> and <i>f</i> |

Pensance,

Penfance, *th*
Fowey, *f*
St Germain, *f*

St Columbe, *th*
Falmouth, *th*
Market jew, *th*

Cumberland

Is also a maritime county, bounded northward with Scotland, and westward with the Irish sea; it contains about 1,040,000 acres, and is in circumference 168 miles; it is a fruitful country, affording good pasture on the hills, and good corn in plenty in the valleys: fish and wild fowl are very plentiful, and coals in abundance; likewise large mines of lead and copper, which are both very good in their kind.

Market-towns.

Carlisle is the chief, *f*
Cockermouth, *tu*
Whitehaven, *th*
Penrith, *tu*
Keswick, *f*
Brampton, *tu*

Holm, *f*
Egremont, *f*
Kirke Oswalde, *th*
Longtown, *th*
Ravenglass, *f*
Wigton, *tu*

Derbyshire

Is an inland county, 130 miles in circumference, and contains about 680,000 acres, affords good store of corn and wood, likewise considerable quantities of freestone and marble, coal and lead mines in abundance; also it yields crystal and alabaster.

Market-towns.

The county-town is Derby, *f*
Chesterfield, *f*
Worksworth, *tu*
Bolsover, *f*

Ailburn, *f*
Alfreton, *m*
Bakewell, *m*
Dronfield, *th*
Fiddlewell, *w*

Devonshire

Is a maritime county about 200 miles in circumference, and contains near 1,920,000 acres; it lies on the west of England, and joins to Cornwall, having the sea on the north and south; it affords great plenty of corn, wool, fowl, fish, as also lead and tin mines; but the principal manufactures are kerries, serges, and lace.

Market-towns.

Exeter is the capit. *w* and *f*
Barnstable, *f*

Honiton, *f*
Oakhampton, *f*

| | |
|----------------------------------|-----------------------|
| Plimpton, <i>f</i> | Axminster, <i>f</i> |
| Tavistock, <i>f</i> | Culliton, <i>th</i> |
| Tiverton, <i>tu</i> | Dodbrook, <i>w</i> |
| Plymouth, <i>m</i> and <i>tu</i> | Autrey, <i>tu</i> |
| Totness, <i>f</i> | Cudee, <i>f</i> |
| Ashburton, <i>f</i> | Hatherleo, <i>tu</i> |
| Biddeford, <i>tu</i> | Moreton, <i>f</i> |
| Torrington, <i>f</i> | Kingsbridge, <i>f</i> |

- Dorsetshire.

Is a county exceeding pleasant and fruitful, and lies upon the channel, being 150 miles in circumference, and contains about 772,000 acres, yielding great plenty of corn, cattle, wool, fish, and wild fowl; and it also affords abundance of hemp, freestone, and marble.

Market-towns.

| | |
|---|-----------------------------------|
| Dorchester is the county-town, <i>f</i> | Cranborn, <i>w</i> |
| Weymouth, <i>tu</i> and <i>f</i> | Blandford, <i>f</i> |
| Malcomb Regis, <i>tu</i> and <i>f</i> | Abbotbury, <i>th</i> |
| Shaftsbury, <i>f</i> | Cerne, <i>w</i> |
| Pool, <i>m</i> and <i>tu</i> | Frampton, <i>th</i> |
| Wareham, <i>f</i> | Sherbourn, <i>tu</i> and <i>f</i> |
| Corfe-castle, <i>tu</i> | Wimbourn, <i>f</i> |
| | Sturminster, <i>th</i> |

Durham

Is a county palatine, and lies very far in the north of the kingdom, the air very cold, and the ground not so fruitful as in the southern parts; it is 107 miles in circumference, and contains about 610,000 acres; its chief commodities are coal, iron, and lead.

Market-towns.

| | |
|--------------------------|----------------------------|
| Durham is the principal, | Sunderland, <i>f</i> |
| Aukland, <i>th</i> | Bernard's castle, <i>w</i> |
| Darlington, <i>m</i> | |

Essex

Is a county bounded by the sea, and lies in the eastern part of England; is 146 miles in circumference, and contains 1,240,000 acres; the soil yields plenty of corn, cattle, and wood: at Walden it affords great store of saffron, and the best in the whole world, the Spanish being nothing in comparison to it.

Market

Market-towns.

Colchester is the county-

town, *f*
 Harwich, *tu*
 Malden, *f*
 Chelmsford, *f*
 Barking, *f*
 Hatfield, *f*
 Rumford, *w*
 Walden, *f*
 Epping, *th* and *f*
 Braintree, *w*
 Bellericay, *tu*

Brentwood, *th*
 Dunmore, *f*
 Goggeshal, *f*
 Grayes, *th*
 Hallstead, *f*
 Hornden, *f*
 Raleigh, *f*
 Manningtree, *tu*
 Waltham-abbey, *tu*
 Troxtead, *f*
 Sudbury, *f*

Gloucestershire

Is a county exceeding fruitful and delightful; and, taken altogether, one of the pleasantest parts of the kingdom: it contains about 800,000 acres, affords some of the best cheese in the nation, and wool hardly inferior to Spanish. It also abounds in wood, iron, steel, and salmon; but its chiefest manufacture is the woolen, which is very extraordinary.

Market-towns.

Gloucester, the county-

town, *w* and *f*
 Cirencester, *m* and *f*
 Tewksbury, *f*
 Blackley, *w*
 Dursley, *th*
 Camden, *w*
 Newnham, *f*
 Stroud, *f*
 Cheltenham, *th*

Lechlade, *tu*
 Newent, *f*
 Sudbury, *th*
 Paintwick, *tu*
 Stow, *th*
 Tetbury, *w*
 Wickmore, *m*
 Thornbury, *f*
 Winchcomb, *f*
 Wotton, *f*

Hampshire,

Or the county of Southampton, borders upon the channel, being a pleasant, healthful, and fruitful country, about 100 miles in circumference, and contains about 1,312,500 acres: it affords vast plenty of corn, grass, sheep, and wood, and particularly famous for hogs and honey, both of which are most excellent in their kind.

Market-towns.

Southampton, the county-
 town, *tu* and *f*

Winchester, *w* and *f*
 Portsmouth, *th* and *f*

Andover,

Andover, *f*
 Limington,
 Alton, *f*
 Basingstoke, *w*
 Kinsclear, *tu*

Ringwood, *w*
 Odiam, *f*
 Rumley, *f*
 Alceston, *th*

To this county belongs the Isle of Wight, of a very considerable extent, the principal town Newport.

Hertfordshire

Is a very fine inclosed county, the land somewhat stony, but yet very fruitful, affording great plenty of corn, and is very remarkable for good malt; it is 130 miles in circuit, contains about 451,023 acres, and hath an excellent air, &c.

Market-towns.

Hartford is the county-town, *f*
 St Alban's, *f*
 Barnet, *m*
 Ware, *tu*
 Barkainstead, *m*
 Rickmansworth, *f*
 Hatfield, *th*

Buntingford, *m*
 Baldock, *th*
 Hitchin, *th*
 Hodson, *th*
 Stevenage, *f*
 Tring, *f*
 Watford, *tu*
 Hempsted, *th*

Herefordshire

Is an inland county, of a good soil, and healthful air, 100 miles in circuit, and contains about 660,000 acres: it affords plenty of wool, wheat, salmon, and cyder, which are generally esteemed the best in the kingdom.

Market-towns.

Hereford is the capital, *w, f, f*
 Leominster, *f*

Weobly, *th*
 Kyniton, *w*
 Ross, *th*

Pemb, *tu*
 Ledbury, *tu*
 Bromyard, *m*

Huntingdonshire

Is a small inland county, of about 67 miles in circuit, and contains about 240,000 acres: it is an open country, but generally very fertile and delightful, abounding in corn and cattle, which are its chiefest commodities.

Market-towns.

Huntingdon the chief, *f*
 St Ives, *m*
 Kimbolton, *f*

St Neots, *th*
 Ramley, *w*
 Yaxley, *tu*

Kent

Is a sea-county on the east part of the channel; it is 160 miles in circumference, and contains about 1,248,000 acres, being distinguished into three parts, viz. the marshy, as Romney marsh, &c. the downs, and the middle or woody part. It affords plenty of corn, good pasture, and the best cherries and pippins in the kingdom.

Market-towns.

| | | |
|---|--------------------|--------------|
| Canterbury (famous for its cathedral) is the capital, w and f | Hithe, f | Lenham, tu |
| Rochester, f | Bromley, th | Lidd, th |
| Maidstone, th | Cranebrook, f | Sevenoak, f |
| Dover, w and f | Cray, w | Tenterden, f |
| Sandwich, w and f | Dartford, f | Malling, f |
| Romney, th | Eltham, m | Milton, f |
| Smarden, f | Fevertham, w and f | Tunbridge, f |
| | Folktone, th | Westram, w |
| | Gravesend, w and f | Woolwich, f |
| | | Wrotham, tu |
| | | Wye, th |

Suffex

Is a maritime county, lying upon the channel between Kent and Hampshire, containing 1,140,000 acres, and is 158 miles in circumference. The county is both fertile and healthful, and is most exceeding pleasant; the south downs being the most delectable or delightful part of the whole kingdom; and, as I know them, I alledge them to have the most beautiful variety, and the pleasanter prospect that can be in the whole culture of nature; the soil being exceeding rich, occasioned by the numerous flocks of sheep there kept; and therefore produce wonderful crops of corn of all sorts: it also hath the finest woods and rivers, and affords the best game for hunting, fishing, and fowling.

Market-towns.

| | |
|----------------------------------|---------------------|
| Chichester is the chief, w and f | Midhurst, th |
| East Grinstead, th | Steyning, w |
| Battings, w and f | Petworth, w |
| Wye, w and f | Battle, th |
| Arundel, w and f | Hailtham, f |
| Northam, f | Bright Helmston, th |
| | Cuckfield, f |

Lancashire

Lancashire

Is a sea-coast county, bounded on the east by the Irish sea; it is 170 miles in circuit, and contains 1,150,000 acres: the air is very wholesome, and the people generally live to an advanced age: the soil is very good, and yields corn of all sorts, particularly oats, which are looked upon as the best in the kingdom: it affords also plenty of pitcoal, and great quantities of excellent fish of all sorts.

Market-towns.

| | | |
|-----------------------------|-----------------------|-----------------------|
| Lancaster is the | Ulverstone, <i>th</i> | Roachdale, <i>tu</i> |
| county-town, <i>f</i> | Bolton, <i>m</i> | Howstead, <i>m</i> |
| Clithero, <i>f</i> | Blackbourn, <i>m</i> | Hostingdon, <i>w</i> |
| Liverpool, <i>f</i> | Cartmel, <i>m</i> | Garistrong, <i>th</i> |
| Preston, <i>w, f, and f</i> | Coln, <i>w</i> | Kirkham, <i>tu</i> |
| Wigan, <i>m and f</i> | Bury, <i>th</i> | Hornby, <i>m</i> |
| Manchester, <i>f</i> | Charnley, <i>tu</i> | Ormskirk, <i>tu</i> |
| Warrington, <i>w</i> | Dalton, <i>f</i> | Poulton, <i>m</i> |

Leicestershire

Is a fine pleasant inland county, 96 miles in circuit, contains about 560,000 acres, abounds in corn and good pasture, and is very remarkable for beans and peas for horses, which thrive there the best of any county in England; it is also eminent for large sheep, which produce abundance of wool, and the longest in the kingdom.

Market-towns.

| | |
|-----------------------------|--------------------------|
| Leicester is the | Hinkley, <i>m</i> |
| county-town, <i>m and f</i> | Lutterworth, <i>th</i> |
| Ashby de la Zouch, <i>f</i> | Loughborough, <i>th</i> |
| Botsworth, <i>w</i> | Melton, <i>tu</i> |
| Harborough, <i>tu</i> | Mountsorrel, <i>m</i> |
| Hallaton, <i>th</i> | Waltham, <i>w and th</i> |

Lincolnshire

Is a maritime county, part bordering on the German sea, and contains about 1,740,000 acres, being 130 miles in circuit: the western parts are good and fruitful, having plenty of grass, and breed the largest oxen in the kingdom, but the eastern parts are marshy, though well stored with wild fowl.

Market

Market-towns.

| | | |
|----------------------------------|-----------------------|------------------------------|
| Lincoln is the capital, <i>f</i> | Stanton, <i>m</i> | Womsfleet, <i>f</i> |
| Boston, <i>w</i> and <i>f</i> | Binbrook, <i>w</i> | Dunnington, <i>f</i> |
| Grantham, <i>f</i> | Alford, <i>tu</i> | Falkingham, <i>th</i> |
| Stamford, <i>m</i> and <i>f</i> | Burton, <i>m</i> | Holbeck, <i>th</i> |
| Grimsby, <i>w</i> | Barton, <i>m</i> | Horncastle, <i>f</i> |
| Gainsborough, <i>tu</i> | Kirton, <i>th</i> | Louth, <i>w</i> and <i>f</i> |
| Bolinbrook, <i>tu</i> | Bourn, <i>f</i> | Sleaford, <i>m</i> |
| Spalding, <i>tu</i> | Tattershall, <i>f</i> | Spilsby, <i>m</i> |

Middlesex

Is the metropolis of the kingdom, an inland county, having the soil fertile by improvement, and the air sweet and wholesome as any in the kingdom; the Thames parts it from the county of Surry, and is on most accounts the finest river in the world.

Market-towns.

| | |
|--|----------------------|
| London, the metropolis hath markets for every day in the week. | Stains, <i>f</i> |
| Westminster, <i>m</i> , <i>w</i> , and <i>f</i> | Uxbridge, <i>th</i> |
| Brentford, <i>th</i> | Enfield, <i>f</i> |
| | Edgeworth, <i>th</i> |

Montmouthshire

Lies upon the borders of Wales, was formerly reckoned a part of it, but is now numbered among the English counties: it is accommodated by the famous river Severn, the second in the kingdom; and contains 34,000 acres, being 80 miles in circuit. This county is healthful, abounding with corn, cattle, salmon, and trout.

Market-towns.

| | | |
|-----------------------------------|---------------------|-----------------------------|
| Monmouth, the principal, <i>f</i> | Caerleon, <i>tu</i> | Pontipool, <i>f</i> |
| Abergavenny, <i>tu</i> | Chepstow, <i>f</i> | Uske, <i>m</i> and <i>f</i> |
| | Newport, <i>f</i> | |

Norfolk

Is a large county, bordering on the northern coast upon the German sea: it is 180 miles in circuit, and contains 1,148,000 acres. The soil is different; in some places fertile, in others sandy, and in some deep and

and heavy. Its principal commodities are corn, wool, honey, and some saffron; but chiefly stuffs and herrings, the first from Norwich, and the latter from Yarmouth. Sometimes jet and amber are found on the sea-coast.

Market-towns.

| | | |
|--|----------------------|----------------------------|
| Norwich is the capital, <i>w</i> , <i>f</i> , and <i>f</i> | Dearham, <i>f</i> | Caston, <i>tu</i> |
| Lynn, <i>tu</i> and <i>f</i> | Walsingham, <i>f</i> | Comer, <i>f</i> |
| Yarmouth, <i>f</i> | Downham, <i>f</i> | Dis, <i>f</i> |
| Thetford, <i>f</i> | Walsham, <i>w</i> | Harleston, <i>w</i> |
| Attleborough, <i>th</i> | Windham, <i>f</i> | Herling, <i>tu</i> |
| Alesham, <i>f</i> | Ropeham, <i>f</i> | Holt, <i>f</i> |
| Buckingham, <i>f</i> | Snasham, <i>f</i> | Wotton, <i>w</i> |
| Burnham, <i>f</i> | Falkenham, <i>th</i> | Worsted, <i>f</i> |
| | Foultham, <i>th</i> | Seby, every second Monday. |
| | Hingham, <i>f</i> | |

Northamptonshire

Is accounted one of the finest inland counties in the kingdom; is 120 miles in circuit, and contains about 550,000 acres. The air is good, and the soil rich; hath several fine rivers, and abounds in corn, wood, and cattle.

Market-towns.

| | | |
|--|---------------------|-------------------------|
| Northampton, the county-town, <i>f</i> | Daventry, <i>w</i> | Wellinborough, <i>w</i> |
| Peterborough, <i>f</i> | Oundle, <i>f</i> | Trapstone, <i>tu</i> |
| Brackley, <i>w</i> | Towcester, <i>f</i> | Cliff, <i>tu</i> |
| | Rothwell, <i>m</i> | |
| | Kettering, <i>f</i> | |

Northumberland

Is a sea-county, bordering upon Scotland; in some parts the air is sharp, the soil thin and barren; but towards the sea it is tolerably fruitful. In this county are abundance of lead and coal-mines, and from hence come the coals called sea-coals. Here are good store of wild fowl, and fish, particularly salmon.

Market-towns.

| | |
|---------------------------------------|-------------------|
| Newcastle is the chief town, <i>f</i> | Morpeth, <i>w</i> |
| Berwick, <i>f</i> | Sexham, <i>tu</i> |
| | Waller, <i>tu</i> |

Nottinghamshire

Is an inland county, in circuit 110 miles, and contains 560,000 acres: the air is good and healthful, the soil but indifferent, (a great part being forest ground), the south part pretty fruitful, the west woody, and yields plenty of pit-coal. The river Trent divides it from Lincolnshire.

Market-towns.

| | |
|----------------------------------|-------------------------------|
| Nottingham is the county- | Southwell, <i>f</i> |
| town, <i>w, f</i> , and <i>f</i> | Bingham, <i>th</i> |
| Newark, <i>w</i> | Workſop, <i>w</i> |
| Redford, <i>w</i> | Tuxford in the clay, <i>m</i> |
| Mansfield, <i>th</i> | |

Oxfordshire

Is one of the most pleasant, healthful, and fertile counties in the kingdom: it is watered with delightful rivers; as the Thames, the beautiful Charrald, &c.: but above all, it is famous for having the finest university in the world, which consists of 20 colleges endowed, and five halls not endowed, viz.

| Founded. | Colleges. | By whom founded. |
|-------------|-----------------|--|
| <i>Anno</i> | | |
| 872 | University, | —by the Saxon King Alfred. |
| 1262 | Baliol, | —by John Baliol, King of Scotland. |
| 1274 | Merton, | —by Walter de Merton, Bishop of Rochester. |
| 1316 | Exeter, | —by Walt. Stapleton, Bp of Exeter. |
| 1325 | Oriel, | —by King Edward II. |
| 1340 | Queen's, | —by Robert Eaglesford, B. D. |
| 1375 | New, | —by William of Wickham, Bp of Winchester. |
| 1427 | Lincoln, | —by Rich. Fleeming and Thomas Rotherham, Bps of Lincoln. |
| 1437 | All-souls | —by Henry Chichely, Abp of Canterbury. |
| 1459 | Magdalen | —by William of Wainfleet, Bishop of Winchester. |
| 1511 | Brazen-nose, | —by Will. Smith, Bp of Lincoln, and Sir Richard Sutton, Knt. |
| 1516 | Corpus Christi, | —by Rich. Fox, Bp of Winchester. |
| 1549 | Christ Church, | —by King Henry VIII. |

Somersetshire

Is a large plentiful sea-county in the west of England, in circumference 204 miles, containing about 907,500 acres; it affords great plenty of excellent corn, and good pasture, which feeds abundance of fine cattle; and also yields plenty of lead, copper, crystal stones, and woad for dyers: its chief manufactures are cloth and ferges.

Market-towns.

| | | |
|---|------------------------------|------------------------|
| Bristol is the capital, <i>w</i> and <i>f</i> | South-Perther-ton, <i>th</i> | Wivelscomb, <i>tu</i> |
| Bath, <i>w</i> and <i>f</i> | Axbridge, <i>th</i> | Canesham, <i>th</i> |
| Wells, <i>w</i> and <i>f</i> | Sheptonmallet, <i>f</i> | Crookhorn, <i>f</i> |
| Bridgewater, <i>th</i> | Somerton, <i>m</i> | Dulverton, <i>f</i> |
| Ilchester, <i>w</i> | Wellington, <i>tu</i> | Glastonbury, <i>tu</i> |
| Taunton, <i>w</i> and <i>f</i> | Bruton, <i>f</i> | Chard, <i>m</i> |
| Wincanton, <i>w</i> | Ilminster, <i>f</i> | Longport, <i>f</i> |
| Watchet, <i>f</i> | Dunstar, <i>f</i> | Pontford, <i>tu</i> |
| | | Writon, <i>tu</i> |

Staffordshire

Is an inland county, containing about 810,000 acres, and is 141 miles in circuit; the air is sharp, but very healthful; the soil different: northward it is hilly and barren; but southward it is fruitful and pleasant, and affords plenty of corn, grass, iron, and pit-coal; the middle part is level, but somewhat woody: this county also affords good stone, marble, alabaſter, and lime-stone.

Market-towns.

| | | |
|---------------------------------------|----------------------|-------------------------|
| Stafford is the county-town, <i>f</i> | Utuxetar, <i>w</i> | Betley, <i>tu</i> |
| Litchfield, <i>tu</i> and <i>f</i> | Eccleshall, <i>f</i> | Locke, <i>w</i> |
| Newcastle, <i>m</i> | Ridgley, <i>tu</i> | Tudbury, <i>tu</i> |
| Burton, <i>th</i> | Browley, <i>tu</i> | Stow, <i>tu</i> |
| Penbridge, <i>tu</i> | Breewood, <i>tu</i> | Wolverhampton, <i>w</i> |
| | Walſhal, <i>tu</i> | |

Suffolk

Is a sea-county, 140 miles in compass, and contains 95,000 acres; the soil different, the best part about Edmundsbury; it affords abundance of cattle, and better the best, but cheese the worst in England.

Market-towns.

| | | |
|---|-----------------------|----------------------|
| Swich is the principal, <i>w, f,</i> and <i>f</i> | Ixworth, <i>f</i> | Neyland, <i>f</i> |
| | Needham, <i>w</i> | Lavenham, <i>tu</i> |
| | Stowmarket, <i>th</i> | Mildenhall, <i>f</i> |
| | B b 2 | Dunwich, |

| | | |
|----------------------|-----------------------|-----------------------|
| Dunwich, <i>f</i> | Newmarket, <i>th</i> | Bildeston, <i>w</i> |
| Orford, <i>w</i> | Beccles, <i>f</i> | Clare, <i>f</i> |
| Aldborough, <i>f</i> | Bury, <i>w</i> | Bungay, <i>th</i> |
| Sudbury, <i>f</i> | Hadley, <i>m</i> | Holfworth, <i>tu</i> |
| Eye, <i>f</i> | Framlington, <i>f</i> | Mendlesham, <i>tu</i> |
| Deddingham, <i>f</i> | Lestoff, <i>w</i> | Woodbridge, <i>w</i> |

Surry

Is an inland county, parted by the river Thames from Middlesex : it contains about 592,000 acres ; and is in compass 112 miles : the country is plentiful, and the air healthful ; it is famous for hunting and horse-racing : the principal goods are hats made in Southwark for exportation.

Market-towns.

| | | |
|-----------------------|---------------------|--------------------|
| Guilford is the | Southwark, <i>w</i> | Kingston, <i>f</i> |
| county-town, <i>f</i> | and <i>f</i> | Croydon, <i>f</i> |
| Ryegate, <i>tu</i> | Darking, <i>th</i> | Farnham, <i>th</i> |

Warwickshire

Is a pleasant, healthful, and plentiful county, 155 miles in compass, and contains about 670,000 acres : the soil for the most part is good and fertile ; on the north a little woody : this county is remarkable for excellent cheese, going by its name.

Market-towns.

| | | |
|-----------------------|-----------------------|---------------------------|
| Warwick is the | Alcester, <i>tu</i> | Nuneaton, <i>f</i> |
| county-town, <i>f</i> | Birmingham, <i>th</i> | Rugby, <i>f</i> |
| Coventry, <i>f</i> | Colehill, <i>w</i> | Southam, <i>m</i> |
| Stratford, <i>th</i> | Henley, <i>m</i> | Suttoncolefield, <i>m</i> |
| Atherstone, <i>tu</i> | Kineton, <i>tu</i> | |

Westmoreland

Is a county in the north west of England ; it is 120 miles in circuit, containing about 510,000 acres : this county abounds in hills and marshes ; and is not very plentiful, but in some of the valleys and intervals, and towards the south.

Market-towns.

| | | |
|-----------------------|---------------------|------------------------|
| Appleby is the | Longdale, <i>th</i> | Kirby Steven, <i>f</i> |
| county town, <i>f</i> | Burton, <i>tu</i> | Orton, <i>w</i> |
| Kendal, <i>f</i> | Ambleside, <i>w</i> | Brough, <i>w</i> |

Wiltshire

Is a fine inland county, 140 miles in compass, and contains

contains about 876,000 acres: in the middle lies Salisbury-plain, very remarkable for its large extent, and for seeding large numbers of sheep; and therefore wool is the principal commodity.

Market-towns.

| | | |
|---|--------------------------|----------------------|
| Salisbury is the capital, <i>w</i> and <i>f</i> | Livingston, <i>w</i> | Calne, <i>tu</i> |
| Hindon, <i>th</i> | Wotton-ballet, <i>th</i> | Warminster, <i>f</i> |
| Chippingham, <i>f</i> | Cricklade, <i>f</i> | Bradford, <i>m</i> |
| Wilton, <i>w</i> | Devises, <i>th</i> | Amisbury, <i>f</i> |
| Marlborough, <i>f</i> | Downton, <i>f</i> | Auburn, <i>tu</i> |
| Malmesbury, <i>f</i> | Westbury, <i>f</i> | Swindon, <i>m</i> |
| | Highworth, <i>w</i> | Trowbridge, <i>f</i> |

Worcestershire

Is a plentiful inland county, 130 miles in circuit, and contains 540,000 acres: the soil is for the most part good and fertile, affords corn in great plenty, and is very numerous in cattle; it yields plenty of fish and fruit. The vale of Evesham is justly esteemed one of the most fertile spots in the kingdom.

Market-towns.

| | | |
|--|--------------------------|---------------------|
| Worcester is the capital, <i>w</i> , <i>f</i> , and <i>f</i> | Droitwich, <i>f</i> | Perthore, <i>tu</i> |
| Evesham, <i>m</i> | Stowerbride, <i>f</i> | Tidbury, <i>tu</i> |
| Bewdley, | Kidderminster, <i>th</i> | Upton, <i>th</i> |
| | Bromsgrove, <i>tu</i> | Shipton, <i>f</i> |

Yorkshire

Is a maritime county, and much the largest in all England; and is divided into three parts, called Ridings, viz. north, east, and west: it is in general a plentiful county, abounding in corn, cattle, fish, and fowl, and famous for breeding fine saddle-horses. It is 320 miles in circumference, and contains 3,770,000 acres; it sends great quantities of woollen cloth to London, and elsewhere, being its chiefest manufacture.

Market-towns.

York is the capital; market-days Thursday and Saturday, with 36 other market-towns, too numerous here to particularize.

The principality of WALES.

Wales was originally independent on England; but in the reign of king Henry VII. it was incorporated

corporated with it. This country is very mountainous and barren, except in the valleys and intervals, where it yields plenty of grass and corn. The situation is westward, bordering on the Irish sea; the air bleak and sharp, but wholesome; the cattle are numerous, but very small; and on the hills there are goats in abundance. This country is divided into North and South, *viz.*

North Wales

Contains Anglesey, Caernarvonshire, Denbighshire, Flintshire, Merionethshire, and Montgomeryshire.

Anglesey is an island in the north-west part of the country, about 80 miles in compass, and contains about 200,000 acres. It affords plenty of corn, cattle, fish, fowl, and millstones (for grinding of corn) in abundance; it has but two market-towns, *viz.* Beaumaris and Newborough; Wednesday is the market day of the first, and Tuesday of the latter.

Caernarvonshire is a sea-coast county, 110 miles in compass, containing about 340,000 acres. It hath plenty of corn, cattle, fish, and wood; the air is healthful, and the soil good, especially the western part, which produces abundance of excellent barley.

Market-towns.

| | |
|-----------------------------------|----------------------|
| Caernarvon is the chief, <i>f</i> | Polbel, <i>w</i> |
| Bangor, <i>w</i> | Aberconway, <i>f</i> |
| Krobach, <i>w</i> | Newin, <i>f</i> |

Denbighshire is 116 miles in circuit, and contains about 410,000 acres. The middle of this county hath plenty of rye, coals, and sheep; it hath also some small lead-mines: but the chief part of it is a valley called Diffryn Cluid, exceeding pleasant and fertile, adorned with several gentlemen's seats, and those good estates. Denbigh is the county-town, and the market-day on Wednesday. Wrexham is another of its principal market-towns, a pretty town, and famous for its market, neat church, and lofty steeple.

Flintshire contains about 160,000 acres, and is in circuit 82 miles. It hath but three towns, *viz.* Flint, St Asaph, and Gairus; the first so small, that it hath no market. It is a hilly country, but the vales are very fertile, and the inhabitants commonly live to an

advance

advanced age. Its commodities are small cattle, butter, cheese, pit coal, lead, and millstones. In this county is St Winifred's well, so famous for curing aches, lameness, and, as some say, for propagation.

Merionethshire is 180 miles in circuit, and contains about 500,000 acres. The country in general is mountainous, but yet not without plenty of small cattle, and other necessaries for the inhabitants. The chief manufacture is cotton-work. The principal town is Harlech, which hath a pretty good market on Saturdays.

Montgomeryshire is in compass 94 miles, and contains 560,000 acres. It is fruitful, though mountainous, and hath six small market-towns, but no manufactures worth notice.

South Wales

Contains Brecknockshire, Cardiganhire, and Caermarthenshire, Glamorganhire, Pembrokehire, and Radnorshire.

Brecknockshire is 106 miles in circuit, and contains about 620,000 acres, divided into hills and valleys; the first but barren, but the latter very plentiful, wholesome, and pleasant. Brecknock is the chief town, and hath a good trade for clothing; it hath two good markets in a week, viz. Wednesdays and Saturdays. The commodities are cattle, fish, and some small quantity of otters fur.

Cardiganhire is 94 miles in compass, and contains about 520,000 acres. It is situated on the banks of the Irish sea, and hath plenty of corn, cattle, fish, fowl, &c. Of late years it is become remarkable for its silver, copper, and lead mines.

Caermarthenshire is one of the most plentiful counties in all Wales; the air good, and the soil fertile. It affords plenty of corn, cattle, salmon, wood, pit-coal, and the best lead. It is 120 miles in compass, containing about 700,000 acres.

Glamorganhire is a very fine plentiful county; in the south part it is so fruitful, that it is called, *The garden of Wales*. It is 112 miles in circuit, and contains about 540,000 acres. Cardiff is the county-town, which keeps two market-days weekly, viz. Wednesday and Saturday.

Pembroke-

Pembrokeshire is a very pleasant and plentiful county, for the most part surrounded by the sea. It is 93 miles in compass, and contains about 520,000 acres. This county is famous for a harbour called *Milford-haven*, which is justly esteemed to be in all respects one of the best in the world. *Pembroke* is the principal town, whose market is kept on Saturday.

Radnorshire is one of the most barren and unfruitful counties in all Wales. It is in circuit 90 miles, and contains about 310,000 acres. The assizes are usually kept at *Prestain*, but *Radnor* is the shire-town, and hath a tolerable market upon Saturday, and *Prestain* hath another on Wednesday.

Scotland

Is situate on the north of England; the capital city is called *Edinburgh*; it is divided into the following shires or counties.

| | | | |
|-------------------------------------|--------------|-----------------------|----------------|
| To the south of the Firth of Forth. | Chief towns. | Galloway, | Kirkcudbright, |
| | | Nithsdale, | Dumfries, |
| | | Annandale, | Annand, |
| | | Eskdale with Eusdale, | |
| | | Liddesdale, | Hermitage, |
| | | Teviotdale, | Jedburgh, |
| | | The Merse, | Dunse, |
| | | Lauderdale, | Lauder, |
| | | Tweeddale, | Peebles, |
| | | Clydetdale, | Glasgow, |
| | | Kyle, | Air, |
| | | Carrick, | Bargeny, |
| | | Lothian, | Edinburgh, |
| | | Stirling, | Stirling, |
| | | Renfrew, | Renfrew, |
| | | Cunningham, | Irvine, |
| | | Isles { Bute, | Rothsay, |
| | | of { Arran, | Kilkerran. |
| | | Peninsula of Cantire. | |

To

Leinster.

To the north of the Firth of Forth

The
de
the
eachIs
lan
into
the

To the north of the Firth of Forth.

Fife,
Monteith,
Lenox,
Argyle,
Perth,
Strathern,
Breadalbane,
Lorn,
Merns,
Angus,
Gowry,
Athol,
Mar,
Badenoch,
Lochaber,
Buchan,
Bamff,
Murray,
Ross,
Sutherland,
Strathnaver,
Caithness.

Chief towns.

St Andrews,
Dumblane,
Dumbarton,
Inverary,
Perth,
Abernethy,

Dunstaffnage,
Bervy,
Dundee,

Blair,
Aberdeen,
Ruthven,
Innerlochy,
Peterhead,
Bamff,
Elgin,
Tain,
Dornock,
Strathy,
Wick.

To these may be added the Hebrides, or Western Isles, said to be above 300 in number, the most considerable of which are Arran, Sky, and Mull; and the Isles of Orkney and Shetland, to the northward, of each of which there are many in number.

Ireland

Is a large island to the west of England and Scotland, the chief city of which is Dublin; it is divided into four provinces, which are again subdivided into the following counties.

To Leinster.

Louth,
Dublin,
Wicklow,
Wexford,
Longford,
Meath,
King's county,
Queen's county.
Kilkenny,
Kildare,
Katherlough,

Chief towns.

Drogheda,
Dublin,
Wicklow,
Wexford,
Longford,
Molingar,
Philippton,
Maryborough,
Kilkenny,
Kildare,
Carlow,

Ulster.

| | | | |
|------------|--|--------------|---|
| Ulster. | Down, Armagh, Monaghan, Cavan, Antrim, Londonderry, Tirone, Fermanagh, Donnegal, | Chief towns. | Down, Armagh, Monaghan, Cavan, Carrickfergus, Londonderry, Dungannon, Inniskilling, Donnegal, |
| | Leitrim, Roscommon, Gallway, Mayo, Sleigo, | | Leitrim, Athlone, Gallway, Mayo, Sleigo, |
| Connaught. | Tipperary, Waterford, Clare, Limerick, Cork, Kerry. | Chief towns. | Clonmel, Waterford, Clare, Limerick, Cork, Dingle. |
| | | | |

In St George's channel, almost equally distant from England, Scotland, and Ireland, is situated the Isle of Man, the royalty of which, under the kings of Great Britain, was formerly in the family of the Stanleys earls of Derby; but the male issue of that family being extinct, it was afterwards enjoyed by the duke of Athol, who is descended from the same, by a female branch; and being bought from him, is now annexed to the crown.

The Britannic isles, above described, are separated from France, on the south by the English channel; and from the Netherlands, Germany, Denmark, and Norway, by the German ocean, on the east; the northern and western sides being washed by the oceans so called.

The Netherlands have Germany on the east and north, the German ocean to the west, and France to the south; they consist of seventeen provinces; of which seven compose a republic called the *United Provinces*; and the remaining ten are subject to the house of Austria.

The seven United Provinces are inhabited by the Dutch, and are commonly called *Holland*, after the name of the most considerable of them; the names of the provinces, and their capitals, follow.

Provinces

| | | | |
|------------|-------------|--------------|--------------|
| Provinces. | Holland, | Chief towns. | Amsterdam, |
| | Zeland, | | Middleburgh, |
| | Utrecht, | | Utrecht, |
| | Gelderland, | | Zutphen, |
| | Over Iffel, | | Deventer, |
| | Friesland, | | Lewarden, |
| | Groningen, | | Groningen. |

The ten provinces are now commonly called the *Austrian Netherlands*, or *Flanders*, from the name of one of them; the names of the provinces, and their capitals, follow.

| | | | |
|--------------|-------------------------------|--------------|-------------|
| Chief towns. | Gelderland, | Chief towns. | Gelders, |
| | Brabant, | | Brussels, |
| | Luxemburgh, | | Luxemburgh, |
| | Limburgh, | | Limburgh, |
| | Flanders, | | Bruges, |
| | Artois, | | Arras, |
| | Hainault, | | Mons, |
| | Namur, | | Namur, |
| | The marquisate of the empire, | | Antwerp, |
| | Malines. | | Malines. |

The empire of Germany has on the east side Prussia, Poland, and Hungary; the Baltic sea, Denmark, and the German ocean, on the north; the Netherlands, and part of France, on the west; and the Alps on the south.

This country is a large republic, whose chief officer is called the *Emperor*; he is elected by the nine electors; their names, and principal cities, follow.

| | | | |
|--------------|---|--------------|----------|
| Chief towns. | The Archbishop of Mentz, | Chief towns. | Mentz, |
| | The Archbishop of Triers, | | Triers, |
| | The Archbishop of Cologne, | | Cologne, |
| | The Queen of Bohemia, | | Prague, |
| | The King of Prussia as Marquis of Brandenburg, | | Berlin, |
| | The King of Poland as Duke of Saxony, | | Dresden, |
| | The King of Great Britain, as Duke of Brunswick-Lunenburgh, | | Hanover, |
| | The Duke of Bavaria, | | Munich, |
| | The Count Palatine of the Rhine. | | Manheim. |
| | | | There |

There are great numbers of other dominions in Germany : but for brevity sake, we shall mention only

| | | |
|------------------------------------|----------------|----------------|
| The Archduchy of Austria, | } Chief towns: | { Vienna, |
| The Landgraviate of Hesse-Cassel, | | { Cassel, |
| The Duchy of Wirtemberg, | | { Stutgard, |
| Alsace, now subject to the French. | | { Strassburgh. |

There are also in Germany several free cities, which are so many small commonwealths, under the protection of the Germanic body ; such as, Ratisbon, Francfort, Hamburgh, &c. And among the Alps are other small commonwealths, commonly known by the name of the Swiss Cantons, the principal of which are Zurich, Bern, Basil, and Friburgh ; with these are confederated the republic of Geneva, and the leagues of the Grisons ; all situated among those mountains.

The kingdom of Hungary hath Poland on the north, Germany on the west, and on the other sides the Turkish empire ; the chief city is called Buda ; other considerable cities are Presburgh, Raab, Zygeth, Canisia, Alba Regalis, Gran, Strigonium, Pest, Temeswaer, &c. all famous in history on account of the contests between the Christians and Turks, for the sovereignty of this kingdom.

It is at present under the dominion of Maria Theresa, daughter of the late emperor Charles VI. who is queen of Hungary and Bohemia, archduchess of Austria, &c. and is married to Francis emperor of Germany, great duke of Tuscany, &c.

Poland is a large elective kingdom, bounded on the east by Cism Tartary and Muscovy ; on the north by part of Muscovy and the Baltic sea ; on the west by Germany ; and on the south by Hungary, and part of Turkey ; the capital city is called Warsaw.

Denmark and Norway, two kingdoms under the same sovereign, are bounded on the north and west by the ocean, on the south by part of Germany and the Baltic sea, and on the east by Sweden : the capital of Denmark is called *Copenhagen* ; and that of Norway, *Bergen*.

Sweden has Denmark on the west, the Baltic sea on the south, Muscovy on the east, and the ocean on the north ; the chief city is called *Stockholm*.

Muscovy, &c.

Muscovy, or Russia, hath part of Sweden and the Baltic sea on the west, Poland and Crim Tartary on the south, Great Tartary in Asia on the east, and the ocean on the north; the ancient capital is called *Moscow*; but the residence of the court is now generally at *Peterburgh* on the Baltic sea. This empire is very extensive, being near as big as all the rest of Europe.

Asia is separated from Europe toward the north-west by the boundaries above described; toward the south-west by the eastern part of the Mediterranean sea, and by the isthmus of Suez and the Red sea, which divide it from Africa; it is bounded on the south by the Indian ocean, on the east by the Pacific, and on the north by the northern or frozen ocean. Its dimensions may be conceived from what follows; Holy Cape, on the northern ocean, in lat. 72. 32. N. long. 179. 45. E. bears from the eastern point of Java, one of the Indian seas, in lat. 8. 30. S. long. 115. 53. E. N. 28. 45. E. distance 5540 miles. And Cape Ava, in the island of Japan, in the Pacific ocean, lat. 34. 45. N. long. 141. 00. E. bears from Smyrna in the Archipelago, lat. 38. 28. N. long. 27. 25. E. S. 87. 48. E. distance 5550 miles.

It seems most regular to divide this large country according to its present possessors, the Grand Seignior or emperor of the Turks, the Sophy or king of Persia, the Great Mogul, and the other potentates of India, the Emperor of China, and the potentates of Tartary. The Turks possessions in Asia are Anatolia, Syria, Arabia, Armenia or Turcomania, Georgia and Mesopotamia, or Diarbeck; of which in their order.

Anatolia, formerly called Asia Minor, is encompassed on the north, west, and south sides, by the Euxine, the Marmarian, the Archipelago, and the Mediterranean seas; it is separated from Syria on the south-east by the mountains called Taurus, and from Turcomania on the east by the river Euphrates.

Its present subdivisions are said to be four, Anatolia Proper, on the north-west, its capital city Bursa; Armenia on the north-east, having a capital of the same name; Caramania, on the south-west, its capital Cogai; and Aladuli, on the south-east, its capital Maraz. Syria, called by the Turks *Suristan*, is generally subdivided into Syria Proper, Phœnicia, and Palestine or Judæa; whose chief cities are Aleppo, Damascus, and Jerusalem.

Arabia (a country which preserves its ancient name, as do the inhabitants their roaming disposition) is bounded on the west by the Red sea, and isthmus of Suez; on the north by Palestine, Syria, and Diarbeck; on the east by the Persian gulf; and on the south-east by the Arabian sea, a part of the Indian ocean.

It is divided into three parts, called the *Desart*, the *Stony*, and the *Happy*; the two first lie to the northward, the other to the south.

There are very few towns in the desart or stony parts of this country, the Arabs living in tents, and removing with their families from place to place, as profit or convenience suggest. But in Arabia the Happy, (one of the finest countries in the world), there are several of note, such as, Medina, where the sepulchre of Mahomet, the founder of the Turkish religion, is; Mecca, his birth-place, to which every Turk, or mussulman, is obliged, by that religion, to come in pilgrimage once in his lifetime, or to send another in his stead; Aden, a place of traffic, Sana, Mocha, Soar, and others.

Armenia or Turcomania is bounded on the west by Anatolia, on the south by Diarbeck, on the east and north by Georgia and the Euxine sea; its principal cities, are Arzerum, Chars, and Van.

Georgia, formerly called Iberia, including Mingrelia, and Gurgestan, is bounded on the north by part of Muscovy, on the west by the Euxine sea, on the south by Turcomania, and part of Persia, and on the east by part of Persia; the cities of greatest note are Fasso and Tesslis.

Mesopotamia or Diarbeck is bounded on the north by Turcomania, on the west by Syria, on the south by Arabia the Desart, and on the east by Persia; its principal cities are Diarbeker, Mosul, and Bagdat.

Besides these large possessions, on the continent of Asia, the Turks hold several islands in the Archipelago, with Rhodes and Cyprus in the Mediterranean sea, the last of which is very considerable.

The next division of Asia, proceeding eastwardly, is Persia; which has the Turkish dominions on the west, the Persian gulf and part of the Indian ocean on the south, the empire of the Great Mogul on the east, and on the north, part of Tartary, the Caspian sea, and part of the Muscovian empire.

This is a very large country, but at present torn to pieces by different competitors for the sovereign power; the capital city is Isphahan; the most considerable of the others are Derbent on the Caspian sea, and Gombroon, and Bassora on the Persian gulf.

Proceeding still eastward, the next empire is that of the Great Mogul, which has Persia on the west, the two Indian peninsulas, and the bay of Bengal, on the south, China on the east, and part of Tartary on the north.

This is another large track, with the inland parts of which the Europeans are not much acquainted.

The principal cities are Agra, Lahor, Delhi, Cabul, and Casimir; but whether Agra or Lahor is the capital, is difficult to determine, as authors do not agree concerning it; it is agreed, however, that the Mogul hath a magnificent palace at each of those cities.

The maritime parts of the continent of India, are divided by the bay of Bengal, a branch of the Indian ocean, into two peninsulas, anciently called India, within or on this side the Ganges, and India without, or beyond the Ganges; besides which two peninsulas, there are several large islands belonging to India; of all which in their order.

The peninsula on this side the Ganges contains several distinct territories or kingdoms, most of which either are or were subject, or at least tributary, to the Mogul; the western side thereof is called the coast of Malabar, the eastern the coast of Coromandel.

The coast of Malabar contains several European settlements; such as, Bombay, an island belonging to the English East-India company, and Goa to the Portuguese, at each of which they have the sovereignty; and the English trade at least, if they have not forts, at Gazurat, Surat, Calicut, and Cochin.

The island called *Ceiland*, or *Ceylon*, by some called *Zeylan*, is situate a little to the east of Cape Comorin, the most southern point of this peninsula.

The coast of Coromandel, which is washed by the bay of Bengal, tends toward the north and north-east from Cape Comorin, and extends to the mouth of the Ganges; the principal settlements of the English on this coast are, Madras or Fort St George, and Fort St David, near which the French have a strong settlement, called Pondicherry; which neighbouring settlements

have for some time past been at war with each other, with various success, the natives headed by their princes, called *Nabobs*, having taken part therein, some on one side, and some on the other. Pondicherry has been lately taken by the English.

The peninsula on the other side of the Ganges, consists of the large kingdoms of Bengal, having a capital of the same name; Pegu, whose chief cities are Pegu and Arracan; Siam, having a capital of the same name; Malacca, situate to the south, is almost compassed by the sea, and the city so called, is situate near the southern extremity; Cochin-China, whose chief city is Cambodia; and Tunquin, whose capital is of the same name.

South-west of Malacca is the island of Sumatra.

South-east of this lies the island of Java, separated by the Straits of Sunda; the western point of which is called Java-head, by English mariners, it being often the first land made by them after they have doubled the Cape of Good Hope; the principal cities are Bantam and Batavia, the latter of which belongs to the Dutch East-India company, who are sovereigns (or if not, yet act as such) over the greatest part of this large and fruitful island.

Eastward from Malacca and Sumatra is the island of Borneo, almost round, and near 600 miles in diameter.

The island Celebes is to the east of Borneo, and much less than it. Proceeding eastward, are the Molucca or Spice-islands; the Dutch have made themselves masters of these, and thereby engross the spice-trade to themselves.

The Philippine isles are very numerous, some authors having reckoned 10,000 of them; the most considerable is Luconia, whose capital is Manila.

To the north and north-west of those, is situated the potent empire of China, reckoned by some to be as big as all Europe; it hath the Pacific ocean on the east and south-east; Cochin-China and Tunquin on the south-west, the Mogul's empire on the west, and to the north-west and north a part of Tartary.

There are a great number of cities in this empire, of which Pekin, situated in the northern part of the country, is the capital; the European trade to the country is chiefly carried on at Canton, a great seaport in one of the southern provinces.

The most considerable Chinese islands are those which compose the empire of Japan; which consists of several large islands, three of which are very considerable, viz. Japan or Nippon, whose capital is Meaco; Tonsa, whose capital is Sanuqui, and Bongo, whose capital bears the same name.

Thus we have taken a cursory survey of all the southern parts of Asia; the northern hath only one general name, viz. Tartary, which has Persia, India, and China, on the south, the Pacific ocean on the east, the northern or frozen ocean on the north, and Muscovy on the west; this large track is subject to divers potentates, some of whom are very little known.

Africa is a large peninsula, which is joined to the continent of Asia by the isthmus of Suez, a narrow desert between the Mediterranean and Red seas; its magnitude may be conceived, by knowing that the Cape of Good Hope is in lat. $34^{\circ} 15'$ S. long. $20^{\circ} 07'$ E. bears from Ceuta in lat. $35^{\circ} 45'$ N. long. $4^{\circ} 42'$ W. S. $18^{\circ} 15'$ E. distance 4440 miles, and that Cape Guardafiu, in lat. $11^{\circ} 48'$ N. long. $50^{\circ} 25'$ E. bears from Cape Sierra Leone in lat. $8^{\circ} 30'$ N. long. $12^{\circ} 07'$ W. N. $87^{\circ} 00'$ E. distance 3700 miles.

Very little of the inland parts of this continent are known to the Europeans; so that only the sea coasts will be mentioned here: beginning at the isthmus of Suez, and coasting first the Mediterranean sea.

Egypt is under the dominion of the Turks; its present capital is called Cairo; the piratical states of Tripoly, Tunis, and Algiers, have capitals of the same name; and the capital of the empire of Morocco is the city of Fez.

Along the coasts of the Atlantic ocean, there are no extensive dominions, the inhabitants being mostly subject to petty princes of their own, who being almost continually at war with one another, sell their prisoners for slaves: the European nations have been induced, for the protection of their trade therein, and other commodities, to erect several small forts in different places, to enumerate which would be tedious: the Madeiras, the Canaries, and the Cape de Verde islands, are the most considerable on this coast; the only one possessed by the English is a very small one, called St Helena, frequented by the East-India ships.

At the southern extremity of this continent is situated

the Cape of Good Hope, where the Dutch East-India company have built a tolerable town, for the convenience of their shipping: from hence again, along the eastern coast, both on the ocean and in the Red sea, very little that is remarkable offers itself,

At some distance, however, from that part of this coast which is washed by the ocean, is situated one of the largest islands in the world, called Madagascar; which has been at different times the asylum of European pirates.

America, by some called the new world, because discovered about 260 years ago, being before that time unknown to the inhabitants of Europe, Asia, and Africa, is divided into two remarkable divisions, called North and South America, which are joined together by the isthmus of Darien, or Panama.

The sea-coast of North America, and part of the inland countries, are at present subject to the European nations; the French possess Canada or New France, whose capital city is Quebec, situate on the great river St Laurence, which running behind the English settlements, has given them the opportunity of extending themselves far up into the country, and becoming very troublesome neighbours to the English; Newfoundland, a large island near the mouth of this river, belongs to the English; and Cape Breton, a much smaller, but well fortified. All French America has been lately taken by the English, under Admirals Boscawen and Saunders, and Generals Amherst and Wolfe.

The English possess a large track of the sea-coast of the Atlantic ocean; for Charlestown in South Carolina, lat. $33^{\circ} 22'$ N. long. $79^{\circ} 50'$ W. bears from Cape Canso in Nova Scotia, lat. $45^{\circ} 10'$ N. long. $59^{\circ} 50'$ W. S. $52^{\circ} 30'$ W. distance 1160 geographical miles; which at $69\frac{1}{2}$ English miles to a degree, make 1345 English miles; which, making allowance for the windings of the coast, may be very well supposed to be really more than 1500 English miles; the names of their plantations or settlements, with their chief towns, follow:

| | | |
|---------------|--------------|---------------|
| Nova Scotia, | } Ch. towns. | Halifax, |
| New England, | | Bolton, |
| New York, | | New York, |
| Pennsylvania, | | Philadelphia, |

New

| | | |
|-------------------|----------------|-----------------|
| New Jersey, East, | } Chief towns. | Elisabeth town, |
| New Jersey, West, | | Elfingburgh, |
| Maryland, | | Baltimore, |
| Virginia, | | James town, |
| North Carolina, | | Edenton, |
| South Carolina, | | Charlestown, |
| Georgia. . | | Savannah. |

The Spaniards possess the sea-coast of Florida, the next southern country, the principal settlement therein being St Augustine; the French have some settlements to the west of these along the river Mississippi, which empties itself into the gulf of Mexico; the principal is Fort Lewis, from whence the country is called Louisiana.

More to the south-west is the empire of Mexico and its dependants, having a capital of the same name, subject to the Spaniards; this country extends itself westward to the Pacific ocean, and the Spaniards send ships yearly from Acapulco, a port therein, across the ocean, to the Phillippine isles in the East Indies.

Northward, on the Pacific ocean, is New Mexico, and the island of California; but of these we know but little.

The continent of South America consists of the following large districts.

| | | | | |
|------------------|----------------|---------------|----------------------------|-------------|
| Terra Firma, | } Chief towns. | Panama, | } In the possession of the | Spaniards, |
| Golden Castile, | | Carthagena, | | Spaniards, |
| Guaiana, | | Surinam, | | Dutch, |
| Peru, | | Lima, | | Spaniards, |
| Chili, | | St Jago, | | Spaniards, |
| Patagonia, | | | | Natives, |
| Terra del Fuego, | | | | Natives, |
| L. Plata, | } | Buenos Aires, | } | Spaniards, |
| Brasil, | | St Salvadore, | | Portuguese, |
| Paraguay, | | Assumption. | | Jesuits, |
| Amazonia. | | | | Natives. |

N. B. Terra del Fuego is an island separated from Patagonia by the straits of Magellan.

The gulf of Mexico, Yuchutan, Honduras, and the Caribbean sea, are separated from the Atlantic ocean by a great number of islands, called the Bahama, the greater and lesser Antilles, and the Caribbee islands; the names of the most considerable are as follow.

Cuba,

| | | | | |
|----------------------------|----------------|-------------|----------------------------|-----------------------|
| Cuba, | } Chief towns. | Havannah, | } In the possession of the | Spaniards, |
| Hispaniola, of St Domingo, | | St Domingo, | | French and Spaniards, |
| Jamaica, | | Port Royal, | | English, |
| Porto Rico, | | Porto Rico, | | Spaniards, |
| Anguilla, | | | | English, |
| Berbuda, | | | | English, |
| St Christopher's, | | | | English, |
| Nevis, | | | | English, |
| Antigua, | | | | English, |
| Montserrat, | | | | English, |
| Barbadoes, | | | | English, |
| Guadaloupe, | | Bridge-town | | French, |
| Martinico, | | | | French, |
| St Martin, | | | | French, |
| Sancta Cruz, | | | | French, |
| St Lucia. | | | | French. |

The islands called Bermudas, lying about 500 leagues east of Florida, are subject to the English.

ASTRONOMY.

Astronomy is a science which treats of the motions and distances of the heavenly bodies, and of the appearances thence arising.

There have been a great variety of opinions among the philosophers of the preceding age, concerning the disposition of the great bodies in the universe, or of the position of the bodies which appear in the heavens: but the notion now embraced by the most judicious astronomers is, that the universe is composed of an infinite number of systems or worlds; that in every system there are certain bodies moving in free space, and revolving at different distances around a sun, placed in or near the centre of the system; and that these suns, or other bodies, are the stars which are seen in the heavens.

That system in which our earth is placed, is by astronomers called the *solar system*; and that opinion which supposes the sun to be fixed, in or near the centre, with several bodies revolving round him, at different distances, is confirmed by all the observations hitherto made.

This opinion is also called the Copernican system, from Nicholas Copernicus, a Polish philosopher, who about

about the year 1473, revived this notion from the oblivion it had been buried in for many ages.

The sun therefore is placed in the midst of an immense space, wherein six opaque spherical bodies revolve about him as their centre.

These wandering globes are called the planets, which at different distances, and in different periods, perform their revolutions, from west to east, in the following order.

I. Mercury is nearest to the sun of all the planets, and performs its course in about three months, or 87 days 23 hours. II. Venus, in about seven months and a half, or 224 days 17 hours. III. The Earth, in a year, or 365 days 6 hours. IV. Mars, in about two years, or 686 days 23 hours. V. Jupiter, in twelve years, or 4232 days 12 hours. VI. and lastly, Saturn, whose * orbit includes all the rest, spends almost thirty years, that is, 10759 days 8 hours, in one revolution round the sun. The distances of the planets from the sun are nearly in the following proportion, viz. supposing the distance of the earth from the sun to be divided into 1000 equal parts; that of Mercury will be about 387 of those parts; of Venus 724; of Mars 1524; of Jupiter 5201; and that of Saturn 9538.

The orbits of the planets are not all in the same plane, but variously inclined to one another; so that, supposing the orbit of the earth to be the standard, the others will have one half above, and the other half below it; intersecting one another in a line passing through the sun.

The plane of the earth's orbit is called the ecliptic; and this the astronomers make the standard, to which the planes of the other orbits are judged to incline.

The right line passing through the sun, and the common intersection of the plane of the orbit of any planet with the ecliptic, is called the line of the nodes of that planet; and the points themselves, wherein the orbit cuts the ecliptic, are called the nodes.

The inclinations of the orbits of the planets, to the plane of the ecliptic, are as follows, viz. the orbit of

* By the orbit of a planet, is commonly understood the track or ring described by its centre round the sun; but by the plane of the orbit is meant a flat surface, extended every way through the orbit infinitely.

Mercury makes an angle of $6^{\circ} 52'$; that of Venus $3^{\circ} 23'$; of Mars $1^{\circ} 52'$; of Jupiter $1^{\circ} 20'$; and of Saturn $2^{\circ} 20'$. The orbits of the planets are not circles, but ellipses or ovals.

What an ellipsis is, may be easily understood from the following description. Imagine two small pegs fixed upright on any plane, and suppose them tied with the ends of a thread, somewhat longer than their distance from one another: now, if a pin be placed in the double of the thread, and turned quite round, (always stretching the thread with the same force), the curve described by the motion will be an ellipsis. The two points where the pegs stood, (about which the thread was turned), are called the focus's or foci of that ellipsis; and if, without changing the length of the thread, as we alter the position of the pegs, we shall then have an ellipsis of a different kind from the former; and the nearer the focus's are together, the nearer will the curve described be to a circle; until at last the two focus's coincide, and then the pin in the doubling of the thread will describe a perfect circle.

The orbits of all the planets have the sun in one of their focus's, and half the distance between the two focus's is called the excentricity of the orbits. This excentricity is different in all the planets, but in most of them it is so small, that in little schemes or instruments, made to represent the planetary orbits, it need not be considered.

If, as before, we suppose the mean distance of the earth from the sun to be divided into 1000 parts; then will the excentricity of Mercury be 81 of those parts; that of Venus 5; that of the Earth 17; that of Mars 141; that of Jupiter 240; and that of Saturn 543 of the same parts.

The six planets above mentioned, are called primaries, or primary planets; but besides these, there are ten other lesser planets; which are called secondaries, moons, or satellites. These moons always accompany their respective primaries, and perform their revolutions round them, whilst both together are also carried round the sun.

Of the six primary planets, there are but three, as far as observation can assure us, that have these attendants, viz. the Earth, Jupiter, and Saturn.

The

The Earth is attended by the moon, who performs her revolution in about $29\frac{1}{2}$ days, at the distance of about 30 diameters of the Earth from it; and once a year is carried round the sun along with the Earth.

Jupiter has four moons or satellites; the first or innermost performs its revolution in about 1 day and $18\frac{1}{2}$ hours, at the distance of $5\frac{2}{3}$ semidiameters of Jupiter from his centre; the second revolves about Jupiter in 3 days and 13 hours, at the distance of 9 of his semidiameters; and the third in 7 days and 4 hours, at the distance of $14\frac{1}{3}$ semidiameters; the fourth and outermost performs its course in the space of 16 days 18 hours, and its distance from Jupiter's centre is $25\frac{1}{3}$ of his semidiameters.

Saturn has no less than five satellites; the first or innermost revolves about him in 1 day and 21 hours, at the distance of $4\frac{1}{8}$ diameters of Saturn, from his centre; the second completes his period in $2\frac{3}{4}$ days, at the distance of $5\frac{3}{5}$ diameters; the third, in about $4\frac{1}{2}$ days, at the distance of 8 diameters; the fourth performs its course in about 16 days, at the distance of 18 diameters; the fifth, and outermost, takes $79\frac{1}{3}$ days to finish his course, and is 54 diameters of Saturn, distant from his centre. The satellites, as well as the primaries, perform their revolutions from west to east; the planes of the orbits of the satellites of the same planet, are variously inclined to one another, and consequently are inclined to the plane of the orbit of their primary.

Besides these attendants, Saturn is encompassed with a thin ring that does no where touch his body: the diameter of this ring is to the diameter of Saturn, as 9 to 4; and the void space between the ring and the body of Saturn, is equal to the breadth of the ring itself; so that, in some situations, the heavens may be seen between the ring and his body.

This surprising phenomenon of Saturn's ring is a modern discovery; neither were the satellites of Jupiter and Saturn known to the ancients; the jovial planets were first discovered by the famous Italian philosopher, Galilæus, by a telescope, which he first invented: and the celebrated Cassini, the French king's astronomer, was the first that saw all the satellites of Saturn; which, by reason of their great distances

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ces from the sun, and the smallness of their own bodies, cannot be seen by us, but by the help of very good glasses.

The motion of the primary planets round the sun (as also of the satellites round their respective primaries) is called their annual motion; because they have one year; or the alterations of the seasons, complete in one of those revolutions. Besides this annual motion, four of the planets, *viz.* Venus, the Earth, Mars, and Jupiter, revolve about their own axis, from west to east; and this is called their diurnal motion. For, by this rotation, each point of their surface is carried successively towards, or from the sun, who always illuminates the hemisphere which is next to him, the other remaining obscure: and while any place is in the hemisphere illuminated by the sun, it is day; but when it is carried to the obscure hemisphere, it becomes night; and so continues, until, by this rotation, the said place is again enlightened by the sun.

The Earth performs its revolution round its axis in 23 hours 56 minutes; Venus in 23 hours; Mars in about 24 hours and 40 minutes; and Jupiter moves round his own axis in 9 hours and 56 minutes.

The sun is also found to turn round his axis from west to east in 27 days; and the moon, which is nearest to us of all the planets, revolves about her axis in a month, or in the space of time that she turns round the earth; so that the lunarians have but one day throughout their year.

The planets are all opaque bodies, having no light but what they borrow from the sun: for that side of them which is next towards the sun, has always been observed to be illuminated, in what position soever they be; but the opposite side, which the solar rays do not reach, remains dark and obscure: whence it is evident, that they have no light but what proceeds from the sun: for if they had, all parts of them would be lucid, without any darkness or shadow. The planets are likewise proved to be globular, because, let what part soever of them be turned towards the sun, its boundary, or the line separating that part from the opposite, always appears to be circular; which could not happen, if they were not globular.

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The Earth is placed betwixt the orbs of Mars and Venus; and Mercury, Venus, Mars, Jupiter, and Saturn, do all turn round the sun; both which may be proved from observations, as follows.

1. Whenever Venus is in conjunction with the sun, that is, when she is in the same direction from the earth, or towards the same part of the heavens the sun is in; she either appears with a bright and round face, like a full moon, or else disappears; or, if she is visible, she appears horned, like a new moon: which phenomena could never happen, if Venus did not turn round the sun, and was not betwixt him and the earth; for since all the planets borrow their light from the sun, it is necessary that Venus's lucid face should be towards the sun; and when she appears fully illuminated, she shews the same face to the sun and the earth; whence, at that time, she must be above or beyond the sun, for in no other position could her illuminated face be wholly seen from the earth. Farther, when she disappears; or, if visible, appears horned; that face of hers, which is towards the sun, is either wholly turned from the earth, or only a small part of it can be seen by the earth; and in this case, she must of necessity be betwixt us and the sun.

Besides the foregoing, there is another argument to prove, that Venus turns round the sun, in an orbit that is within the earth's; because she is always observed to keep near the sun, and in the same quarter of the heavens that he is in, never receding from him more than about $\frac{1}{3}$ of a whole circle, and therefore she can never come in opposition to him; which would necessarily happen, did she perform her course round the earth either in a longer or shorter time than a year.

And this is the reason, why Venus is never to be seen near midnight, but always either in the morning or evening, and at most not above three or four hours, before sun-rising or after sun-setting. From the time of Venus's superior conjunction (or when she is above the sun) she is more easterly than the sun, and therefore sets later, and is seen after sun-setting, and then she is commonly called the Evening-star: but from the time of her inferior conjunction, till she comes again to the superior, she then appears more westerly than the sun, and is only to be seen in the morning,

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before sun-rising, and is then called the Morning-star.

After the same manner, we prove that Mercury turns round the sun, for he always keeps in the sun's neighbourhood, and never recedes from him so far as Venus does; and therefore the orbit of Mercury must lie within that of Venus: and on account of his nearness to the sun, he can seldom be seen without a telescope.

Mars is observed to come in opposition, and likewise to have all other aspects with the sun; he always preserves a round, full, and bright face, except when he is near his quadrate aspect, when he appears somewhat gibbous, like the moon three or four days before or after the full: therefore the orbit of Mars must include the earth within it, and also the sun; for if he was betwixt the sun and us, at the time of his inferior conjunction, he would either quite disappear, or appear horned, as Venus, and the moon, do in that position.

Mars, when he is in opposition to the sun, looks almost seven times larger in diameter, than when he is in conjunction with him; and therefore must needs be almost seven times nearer to us, in one position than in the other: for the apparent magnitudes of far distant objects increase, or decrease, in proportion to their distances from us; but Mars keeps always nearly, at the same distance from the sun; therefore it is plain, that it is not the earth, but the sun, that is the centre of his motion.

It is proved, in the same way, that Jupiter and Saturn have both the sun and earth within their orbits; and that the sun, and not the earth, is the centre of their motions; although the disproportion of the distance from the earth is not so great in Jupiter as in Mars, nor so great in Saturn as it is in Jupiter, by reason that they are at a much greater distance from the sun.

We have now shewn, that all the planets turn round the sun, and that Mercury and Venus are included between him and the earth; whence they are called the inferior planets; and that the earth is placed between the orbits of Mars and Venus, and therefore included within the orbits of Mars, Jupiter, and Saturn; whence they are called the superior planets: and since the earth is in the middle of these moveable bodies, and is of the same nature with them, we may conclude, that she has the same sort of motion.

but that she turns round the sun, is proved thus :

All the planets seen from the earth appear to move very unequally ; as sometimes to go faster, at other times slower, and sometimes to be stationary, or not to move at all ; which could not happen if the earth stood still.

The annual periods of the planets round the sun are determined, by carefully observing the length of time, since their departure from a certain point in the heavens, (or from a fixed star), until they arrive to the same again. By these sorts of observations, the ancients determined the periodical revolutions of the planets round the sun ; and were so exact in their computations, as to be capable of predicting eclipses of the sun and moon ; but since the invention of telescopes, astronomical observations are made with greater accuracy, and of consequence our tables are far more perfect than those of the ancients.

And, in order to be as exact as possible, astronomers compare observations made at a great distance of time from one another, including several periods ; by which means the error that might be in the whole, is in each period subdivided into such little parts, as to be very inconsiderable. Thus, the mean length of a solar year is known even to seconds.

The diurnal rotation of the planets round their axis was discovered by certain spots which appear on their surfaces ; these spots appear first on the margin of the planets disks, (or the edge of their surfaces), and seem to creep towards their middle ; and so on, going still forward, till they come to the opposite side or edge of the disk, where they set or disappear ; and after they have been hid for the same space of time that they were visible, they again appear to rise, in or near the same place, as they did at first ; then to creep on progressively, taking the same course as they did before. These spots have been observed on the surfaces of the Sun, Venus, Mars, and Jupiter ; by which means it has been found, that these bodies turn round their own axis, in the times before mentioned.

It is very probable that Mercury and Saturn have likewise a motion round their axis, that all the parts of their surface may alternately enjoy the light and heat of the sun, and receive such changes as are pro-

per and convenient for their nature; but, by reason of the nearness of Mercury to the sun, and Saturn's immense distance from him, no observations have hitherto been made, whereby their spots (if they have any) could be discovered, and therefore their diurnal motions cannot be determined. The diurnal motion of the earth is concluded to exist from the apparent revolution of the heavens, and of all the stars round it, in the space of a natural day. For it is much easier to conceive that this, comparatively, small globe should turn round its own axis, once in 24 hours, than that such a great number of much larger bodies, some of them so immensely distant, should revolve round it in so short a space of time. The solar spots do not always remain the same, but sometimes old ones vanish, and afterwards others succeed in their room; sometimes several small ones gather together, and make one large spot, and sometimes a large spot is seen to be divided into many small ones. But notwithstanding these changes, they all turn round with the sun in the same time.

Each planet is observed always to pass through the constellations Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces; and it also appears, that every one has a track peculiar to itself; whereby the paths of the six planets form, among the stars, a kind of road which is called the zodiac; the middle path whereof is called the ecliptic, is the orbit described by the earth with which the orbits of the other planets are compared.

As the ecliptic runs through twelve constellations, it is supposed to be divided into twelve equal parts, of 30 degrees each, called signs, having the same name with the twelve constellations they run through.

The plane of the ecliptic is supposed to divide the celestial sphere into two equal parts, called the Northern and Southern hemispheres; and a body situated on either of these hemispheres is said to have north or south latitude, according to the hemisphere it is in: so that the latitude of a celestial object is its nearest distance from the ecliptic.

The planes of the other five orbits are observed to lie partly in the northern, and partly in the southern hemisphere; so that every one cuts the ecliptic in two opposite

opposite points called Nodes; one called the ascending node, is that through which the planet passes, when it moves out of the southern into the northern hemisphere; and the other, called the descending node, is that through which the planet must pass, in going out of the northern into the southern hemisphere.

The right line joining the two nodes of any planet, is called the line of the nodes.

The names to most of the constellations were given by the ancient astronomers who reckoned that star in Aries, now marked γ , (according to Bayer), to be the first point in the ecliptic, this star being next the sun when he entered the vernal equinox; and at that time each constellation was in the sign by which it was called: but observations shew, that the point marked in the heavens by the vernal equinox has been constantly going backwards, by a small quantity every year; whereby the stars appear to have advanced as much forwards, so that the constellation Aries is now almost removed into the sign Taurus; the said first star in Aries being got almost 30 degrees forwards from the equinox; which difference is called the *procession of the equinoxes*, whereof the yearly alteration is about 50 seconds of a degree, or about a degree in 72 years.

All the planets have one common focus, in which the sun is placed: for as no other supposition can solve all the appearances that are observed in the motion of the planets, and as it also agrees with the strictest physical and mathematical reasoning; therefore it is now received as an elementary principle.

The line of the nodes of every planet passes through the sun; for as the motion of every planet is in a plane passing through the sun, consequently the intersections of these planes, that is, the lines of the nodes, must also pass through the sun.

All the planets in their revolutions are sometimes nearer, sometimes farther from the sun: this is a consequence of the sun not being placed in the centre of each orbit, the orbits being ellipses.

The aphelion, or superior apsis, is that point of the orbit which is farthest distant from the sun: and the perihelion, or inferior apsis, is that point which is nearest the sun: and the transverse diameter of the or-

bit, or the line joining the two apses, is called the line of the apses or apsidæ.

The planets move faster as they approach the sun, or come nearer to the perihelion, and slower as they recede from the sun, or come nearer the aphelion: this is not only a consequence from the nature of the planets motions about the sun, but is confirmed by all good observations.

If a right line be drawn from the sun, through any planet, (which line is called by some the *vector radius*), and be supposed to revolve round the sun with the planet, then this line will describe, or pass through every part of the plane of the orbit, so that the vector radius may be said to describe the area of the orbit.

There are two chief laws observed in the solar system, which regulate the motion of all the planets; namely,

I. The planets describe equal areas, in equal times: that is, in equal portions of time, the vector radius describes the equal areas or portions of the space contained within the planet's orbit.

H. The squares of the periodical times of the planets are as the cubes of the mean distances from the sun: that is, as the square of the time which a planet, *A*, takes to revolve in its orbit, is to the square of the time taken by any other planet, *B*, to run through its orbit; so is the cube of the mean distance of *A* from the sun, to the cube of the mean distance of *B* from the sun.

The mean distance of a planet from the sun is its distance from him, when a planet is at either extremity of the conjugate diameter; and is equal to half of the transverse diameter.

The foregoing laws are the two famous laws of Kepler, a great astronomer, who flourished in Germany about the beginning of the 17th century, and who deduced them from a multitude of observations; but the first who demonstrated these laws, was the incomparable Sir Isaac Newton.

By the second law, the relative distances of the planets from the sun are known; and was the relative distance of any one known, the absolute distances of all the others would thereby be obtained.

Beside the planets already mentioned, there are other great bodies, that sometimes visit our system

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which are a sort of temporary planets; for they come and abide with us for a while, and afterwards withdraw from us, for a certain space of time, after which they again return. These wandering bodies are called comets.

The motion of the comets in the heavens, according to the best observations hitherto made, seems to be regulated by the same immutable law with the planets: for their orbits are elliptical, like those of the planets, but vastly narrower or more excentric. Yet they have not all the same direction with the planets, who move from west to east, for some of the comets move from east to west; and their orbits have different inclinations to the earth's orbit; some inclining northwardly, others southwardly, much more than any of the planetary orbits do.

Although both the comets and the planets move in elliptic orbits, yet their motions seem to be vastly different: for the excentricities of the planets orbits are so small, that they differ but little from circles; but the excentricities of the comets are so very great, that the motions of some of them seem to be almost in right lines, tending directly towards the sun.

Now, since the orbits of the comets are so extremely excentric, their motions when they are in their perihelia, or nearest distance from the sun, must be much swifter, than when they are in their aphelia, or farthest distance from him; which is the reason why the comets make so short a stay in our system; and, when they disappear, are so long in returning.

The figures of the comets are observed to be very different; some of them send forth small beams, like hair, every way round them: others are seen with a long fiery tail, which is always opposite to the sun. Their magnitudes are also very different; but in what proportion they exceed each other, is as yet uncertain. Nor is it probable that their numbers are yet known, for they have not been observed with due care, nor their theories discovered, but of late years. The ancients were divided in their opinions concerning them; some imagined that they were only a kind of meteors, kindled in our atmosphere, and were there again dissipated; others took them to be some ominous prodigies. But modern discoveries prove that they are

are worlds, subject to the same laws of motion as the planets are : and they must be very hard and durable bodies, else they could not bear the vast heat, which some of them, when in their perihelia, receive from the sun, without being utterly consumed. The great comet which appeared in the year 1680, was within $\frac{1}{3}$ part of the sun's diameter from his surface ; and therefore its heat must be prodigiously intense beyond imagination : and when it is at its greatest distance from the sun, the cold must be as rigid.

The fixed stars are those bright and shining bodies, which, in a clear night, appear to us every where dispersed through the boundless regions of space. They are termed *fixed*, because they are found to keep the same immutable distance, in all ages, without having the motions observed in the planets. The fixed stars are all placed at such immense distances from us, that the best of telescopes represent them no bigger than points, without having any apparent diameters.

It is evident from hence, that all the stars are luminous bodies, and shine with their own proper and native light, else they could not be seen at such a great distance. For the satellites of Jupiter and Saturn, though they appear under considerable angles through good telescopes, yet are altogether invisible to the naked eye.

Although the distance betwixt us and the sun is vastly large, when compared to the diameter of the earth, yet it is nothing when compared with the prodigious distance of the fixed stars ; for the whole diameter of the earth's annual orbit, appears from the nearest fixed star no bigger than a point, and the fixed stars are at least 100,000 times farther from us than we are from the sun ; as may be demonstrated from the observations of those who have endeavoured to find the parallax of the earth's annual orbit, or the angle under which the earth's orbit appears from the fixed stars.

Hence it follows, that though we approach nearer to some fixed stars at one time of the year than we do at the opposite, and that by the whole length of the diameter of the earth's orbit ; yet this distance, being so small in comparison with the distance of the fixed stars, their magnitudes or positions cannot thereby be sensibly altered. Therefore we may always without error suppose ourselves to be in the same centre of the heavens,

heavens, since we have always the same visible prospect of the stars without any alteration.

If a spectator was placed as near to any fixed star, as we are to the sun, he would there observe a body as big, and every way like as the sun appears to us ; and our sun would appear to him no bigger than a fixed star ; and undoubtedly he would reckon the sun as one of them, in numbering the stars. Wherefore since the sun differeth in nothing from a fixed star, the fixed stars may be reckoned as so many suns.

It is not reasonable to suppose, that all the fixed stars are placed at the same distance from us ; but it is more probable that they are every where interspersed, through the vast indefinite space of the universe ; and that there may be as great a distance between any two of them, as there is betwixt our sun and the nearest fixed star. Hence it follows, why they appear to us of different magnitudes, not because they really are so, but because they are at different distances from us ; those that are nearest excelling in brightness and lustre those that are more remote, which give a fainter light, and appear smaller to the eye.

The astronomers distribute the stars into several orders, or classes : those that are nearest to us, and appear brightest to the eye, are called stars of the first magnitude ; those that are nearest to them in brightness and lustre, are called stars of the second magnitude ; those of the third class, are stiled stars of the third magnitude ; and so on, until we come to the stars of the sixth magnitude, which are the smallest that can be discerned by the naked eye. There are infinite numbers of smaller stars, that can be seen through telescopes ; but these are not reduced to any of the six orders, and are only called telescopic stars. It may be here observed, that though the astronomers have reduced all the stars that are visible to the naked eye, into some one or other of these classes ; yet we are not to conclude from thence, that all these stars answer exactly to some or other of these orders ; but there may be in reality as many orders of the stars as they are in number, few of them appearing of the same bigness and lustre.

The ancient astronomers, that they might distinguish the stars, in regard to their situation and position to each other, divided the whole starry firmament into several

several asterisms or systems of stars, consisting of those that are near to one another. These asterisms are called *Constellations*, and are digested into the forms of some animals, as men, lions, bears, serpents, &c. or to the images of some known things, as of a crown, a harp, a triangle, &c.

The starry firmament was divided by the ancients into 48 images or constellations; twelve of which they placed in that part of the heavens wherein are the planes of the planetary orbits; which part is called the zodiac, because most of the constellations placed therein, resemble some living creature. The two regions of the heavens on each side of the zodiac, are called the north and south parts of the heavens.

The constellations within the zodiac are, 1. Aries, the Ram; 2. Taurus, the Bull; 3. Gemini, the Twins; 4. Cancer, the Crab; 5. Leo, the Lion; 6. Virgo, the Virgin; 7. Libra, the Balance; 8. Scorpio, the Scorpion; 9. Sagittarius, the Archer; 10. Capricornus, the Goat; 11. Aquarius, the Water bearer; and, 12. Pisces, the Fishes.

The constellations on the north side of the zodiac are thirty-six, viz. the Little Bear; the Great Bear, the Dragon; Cæpheus, a king of Ethiopia; the Greyhounds; Bootes; the keeper of the bear; Mons Mene-laus; Berenice's hair; Charles's Heart; the Northern Crown; Hercules, with his club watching the dragon; Cerberus; the Harp; the Swan; the Fox; the Goose; the Lizard; Cassiopeia; Perseus; Andromeda; the Great Triangle; the Little Triangle; Auriga; Pegasus, or the Flying Horse; the Dolphin; the Arrow; the Eagle; Serpentarius; the Serpent; Sobieski's Shield; Camelopardus; Antinous; the Colt; the Lynx; the Little Lion; and Musca.

The constellations noted by the ancients on the south side of the zodiac were the Whale, the river Eridanus, the Hare, Orion, the Great Dog, Little Dog, the Ship Argo, Hydra, the Centaur, the Cup, the Crow, the Wolf, the Altar, the Southern Crown, and the Southern Fish. To these have been lately added the following, viz. the Phoenix, the Crane, the Peacock, Noah's Dove, the Indian, the Bird of Paradise, Charles's Oak, the Southern Triangle, the Fly or Bee, the Swan, the low, the Chameleon, the Flying Fish, Toucan, or the

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American Goose, the Water-serpent, and the Sword-fish.

The ancients placed these particular constellations or figures in the heavens, either to commemorate the deeds of some great man, or of some notable exploit or action, or else took them from the fables of their religion, &c. And the modern astronomers do still retain them, to avoid the confusion that would arise by making new ones, when they compare the modern observations with the old ones.

Some of the principal stars have particular names given them, as Syrius, Arcturus, &c. There are also several stars that are not reduced into constellations, and these are called unformed stars.

Besides the stars visible to the naked eye, there is a very remarkable space in the heavens, called the *Galaxy*, or *Milky Way*; this is a broad circle of a whitish hue like milk, going quite round the whole heavens; and consisting of an infinite number of small stars, visible through a telescope, though not discernible by the naked eye, by reason of their exceeding faintness; yet with their light, they combine to illustrate that part of the heavens where they are, and to cause that shining whiteness.

The places of the fixed stars, or their relative situations one from another, have been carefully observed by astronomers, and digested into catalogues. The first among the Greeks, who reduced the stars into a catalogue, was Hipparchus, who, from his own observations, and of those who lived before him, inserted 1022 stars in his catalogue; about 120 years before the Christian era; this catalogue has been since enlarged and improved, by several learned men, to the number of 3000, of which there are a great many telescopical, and not to be discerned by the naked eye; and these are all ranked in the catalogue as stars of the seventh magnitude.

It may seem strange to some, that there are no more than this number of stars visible to the naked eye; for sometimes, in a clear night, they seem to be innumerable. But this is only a deception of our sight, arising from their vehement sparkling, while we look upon them confusedly, without reducing them into any order; for there can seldom be seen above 1000 stars in the whole heavens, with the naked eye, at the same

same time : and if we should distinctly view them, we shall not find many but what are inserted upon a good celestial globe.

Although the number of stars that can be discerned by the naked eye are so few, yet it is probable there are many more, which are beyond the reach of our optics ; for through telescopes they appear in vast multitudes, every where dispersed, throughout the whole heavens ; and the better our glasses, the more of them we still discover. The ingenious Dr Hooke has observed 78 stars in the Pleiades, of which the naked eye is never able to discern above 7 ; and in Orion, which has but 80 stars in the British catalogue, (and some of them telescopical), there have been numbered 2000 stars.

Those who think that all these glorious bodies were created for no other purpose, than to give us a little dim light, must entertain a very slender idea of the divine Wisdom ; for we receive more light from the moon itself, than from all the stars put together.

And since the planets are subject to the same laws of motion with our earth, and some of them not only equal to, but vastly exceed it in magnitude, it is not unreasonable to suppose, that they are all habitable worlds. And since the fixed stars are nowise behind our sun, either in bigness or lustre ; is it not probable, that each of them have a system of planetary worlds turning round them, as we do round our sun. And if we ascend as far as the smallest star we can see, shall we not then discover innumerable more of the glorious bodies, which now are altogether invisible to us ? and so *ad infinitum*, through the boundless space of the universe. What a magnificent idea must this raise in us of the Divine Being ! who is every where and at all times present, displaying his divine power, wisdom, and goodness, amongst all his creatures !

The next thing I shall proceed to, is to say some thing in relation to the art of making dials : but it may be proper to describe and speak of the use of a very necessary instrument, called a *quadrant*, the shape of which is here represented. See tab. 1. fig. 1.

The quadrant, or quarter of a circle, is variously useful, on sundry accounts, *viz.* to take heights and distances, whether accessible or inaccessible ; to find the hour of the day, &c.

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FIG. 2 *Gunters line*

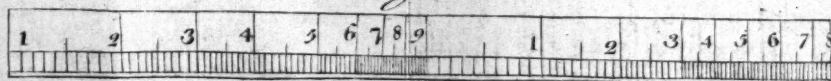


FIG. 1

An erect and direct W Dial

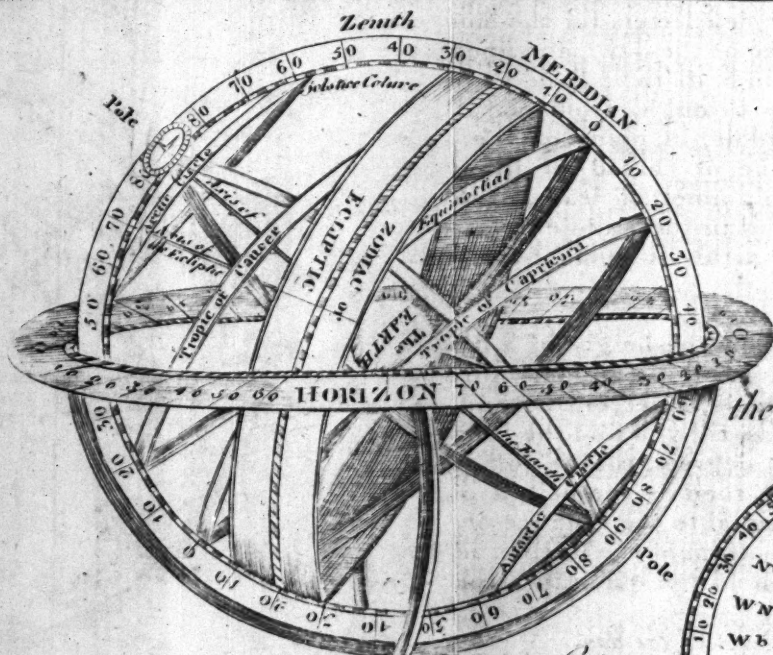
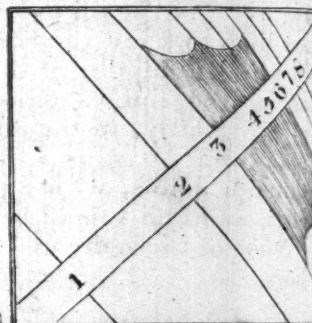
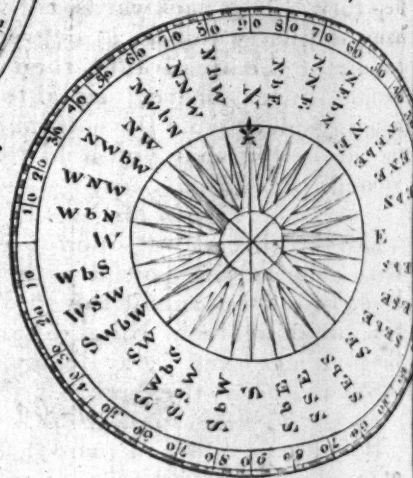


FIG. 3

the Mariners Compass



The Artificial Sphere



Its description.

The outward ark is divided into 90 parts or degrees, (being the fourth part of the circle of the sphere), and figured from 10, 20, &c. to 90; above which figures, are letters signifying the 12 calendar months of the year, as *J.* for January, *F.* for February, &c. And again over these letters for the months, are lines to know the hour of the day: and upon the line *G D*, are sights of thin brads to be spied through, or for the sun to shine through, from one to the other. Lastly, in the middle, or point of the quadrant, viz. at *A*, is a line or thread of silk fixed through a hole, with a plummet of lead at the end of it, and also a small bead in the middle.

Some of the many uses of this instrument are as follows.

Of heights.

Suppose you would know the height of a steeple, tower, or tree; hold up the quadrant, and view through the sights the top of the steeple, tower, or tree, and then step forwards or backwards, till you find the plummet hang at liberty just at 45 degrees, that is, just in the middle of the quadrant; then is the height of the steeple, tower, or tree, equal to the distance of your standing-place from the bottom of the steeple, adding for the height that you hold the quadrant from the ground.

To find the hour of the day.

Lay the thread just upon the day of the month, then hold it till you slip the small bead, or pin's head, to rest on one of the 12 o'clock lines; then let the sun shine from the sight at *G* to the other at *D*, the plummet hanging at liberty, the bead will rest on the hour-line of the day.

To find the latitude of a place nearly.

Hold up the quadrant, and through the sights thereof (or along the edge) spy, in a clear star-light night, the north-pole star; the plummet hanging at liberty, the thread will rest on the degrees of latitude of the place you are in, or where you take your observation.

Of Dialling.

Dialling is a very ancient art, even as old as the time of King Hezekiah, where mention is made
E c of

of the dial of Ahaz, in the 2d book of Kings, chap. xx. vers. 11.

The gnomon or subtile of a post or horizontal dial, should point directly south, and its back will be then directly north. The south may be truly known by a good watch or clock, just at noon; for then the sun is always at the meridian, and makes just 12 o'clock; so that knowing the south, it will not be difficult to find the north, it being its opposite.

To fix a dial north and south.

Fasten your board on the top of a post, and then with your compasses make 4, or 5, or 6 circles, one within the other, from the centre or middle, where place a large pin perpendicular or upright, and nicely observe, when the sun shines in the forenoon, on which circle the head of the pin shadoweth; then there make a mark; and do the same in the afternoon, when the shade of the pin's head comes on the same circle; and from the midway of the two marks, draw a line to the centre, on which place your meridian or 12 o'clock line; so will the post-dial point north and south.

By the meridian line you may also know when the moon, or a star of magnitude, comes to the south; which when they do, they are always at the highest, whether by night or day.

The following figure represents a horizontal dial. See tab. 1. fig. 2.

First, with a ruler draw the line *AB*, then cross it in the centre with another line, as the line *CD*, which is the meridian or 12 o'clock line; and the first line drawn, viz *AB*, is the 6 o'clock line: then open your compasses, and place one foot at the beginning of the degrees, or the arc-edge of your quadrant, and extend the other foot to 60 degrees, and with that extent place one foot in the centre of the dial, at *E*, where the two first lines cross one another, and draw the semicircle, *ACB*.

Next having the 12 o'clock line *EC*, to know what distance must be set off from it, for 1 o'clock and 11 o'clock being all one, be directed by this small table, viz.

| 52° | | Lat. | |
|-------|----|-------|----|
| D. M. | | Hors. | |
| 11 | 55 | 1 | 11 |
| 24 | 26 | 2 | 10 |
| 38 | 13 | 3 | 9 |
| 53 | 44 | 4 | 8 |
| 71 | 0 | 5 | 7 |

in

In the first column, against 1 hour and 11, you find 11 degrees and 55 minutes; which take off the age of quadrant, by setting one foot of the compasses at the beginning of the divisions under *B*, and the other foot to 11 degrees 55 minutes; the compasses so opened, set one foot in the circle at the bottom of the 12 o'clock line, and with the other foot of the compasses make a mark in the circle both towards *A* and *B*, and from those two marks, draw lines towards the centre, which you may afterwards go over with ink. Then to make the hour-lines from 2 and 10 o'clock, look in the table for 2 and 10 hours, where you will find 24 degrees and 26 minutes, which take off the degrees of your quadrant, and mark as the other from the 12 o'clock line both ways in the circle.

Note, The same is to be done for 3 and 9 o'clock; and also for 4 and 8 o'clock; and the like for 5 and 7 o'clock; and for 5 and 7, 4 and 8, above the 6 o'clock line, set off the same distance as below it.

Then for the height of the gnomon or stile, admit 52 degrees, take it off the edge of the quadrant with the compasses as before, and with that extent set one foot at the bottom of the 12 o'clock line, as before, and extend the other foot in the circle, and make a mark, and then draw a line from thence to *E* the centre, for the upper edge of the stile, and so raise it directly over the meridian or 12 o'clock line.

Of upright planes.

Those planes are said to be erect or upright which stand perpendicular to the horizon of the place, whose upper part pointeth to the zenith, and their lower part to the nadir; and such are the walls of houses, churches, steeples, &c. against which dials are commonly made.

How to draw the hour-lines on a direct south plane, in the lat. of 51 deg. 32 min. is described by the following representation. See tab. 1. fig. 3.

First, draw the circle *Z E W N*, representing an upright direct south plane; next cross it with the diameters *Z Q N* for the meridian or 12 o'clock line; and *W Q E* for the prime vertical circle, or hour-line of six.

Secondly, out of your line of chords, take 38 degrees 28 minutes, (the complement of the latitude of

the place), and set that distance on the dial plane from Z to a , and from E to b , and from N to e .

Thirdly, lay a ruler from W to a , and it will cut the meridian ZN in the point P , the pole of the world: and a ruler also laid from W to b will cut the meridian in \mathcal{E} , which is the point through which the equinoctial must pass; for the drawing of which, you have three points given, *viz.* E , \mathcal{E} , W , and the centre will always be in the meridian line ZN .

Fourthly, divide the semicircle ENW into 12 equal parts, as the points, OOO , &c.

Fifthly, lay a ruler to \mathcal{Q} and each of these points OOO , and the ruler will cross the equinoctial circle in the points *** &c. dividing that into 12 unequal parts.

Sixthly, lay a ruler to P (the pole of the world) and every one of the marks * * &c. and the ruler will cross the circle of the plane in the points | | | &c.

Lastly, if through the centre \mathcal{Q} and the respective points | | | &c. you draw right lines, they will be true hour-lines of an erect south plane.

For the gnomon or stile, take 38 deg. 28 min. out of the line of chords, and set them from N to e , drawing the line $\mathcal{Q}e$ for the axis of the stile, which must hang directly over the meridian or hour-line of 12, and point downwards to the south-pole, because the plane beholds the south part of the meridian.

In making this dial, you make two dials: for the erect direct north dial is but the backside of the south; for as this beholdeth the south part of the meridian, so the other faceth the north part of the meridian; and as the meridian line in the south dial shews when it is 12 o'clock at noon, so the backside thereof, *viz.* the north side, represents the hour-line of 12 o'clock at midnight, and therefore not expressed, nor the hour-lines of 9, 10, 11, at night, or of 1, 2, 3, in the morning, the sun being never seen by us above the horizon at those hours: so that the north dial is capable of only receiving the hours of 4, 5, 6, 7, and 8 in the morning, and 4, 5, 6, 7, and 8 at night, and (in this latitude) not all of them neither: for it shines not in this plane at eight in the morning, nor at 4 in the afternoon, but it is best to put them down, as in the figure following, to know how much it

Erect Di



An East Latitude



FIG. 4

Direct North Dial

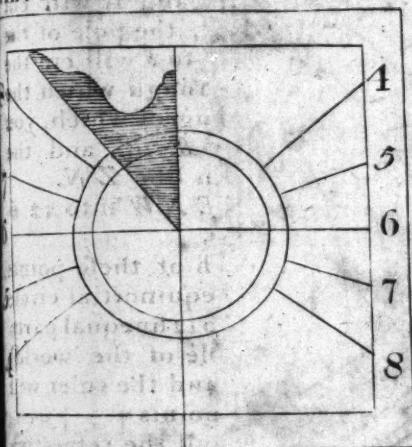


FIG. 2



FIG. 5

An East Direct Dial in
Latitude 31 D. 32 M.

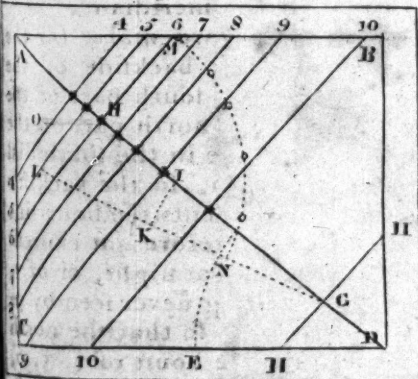
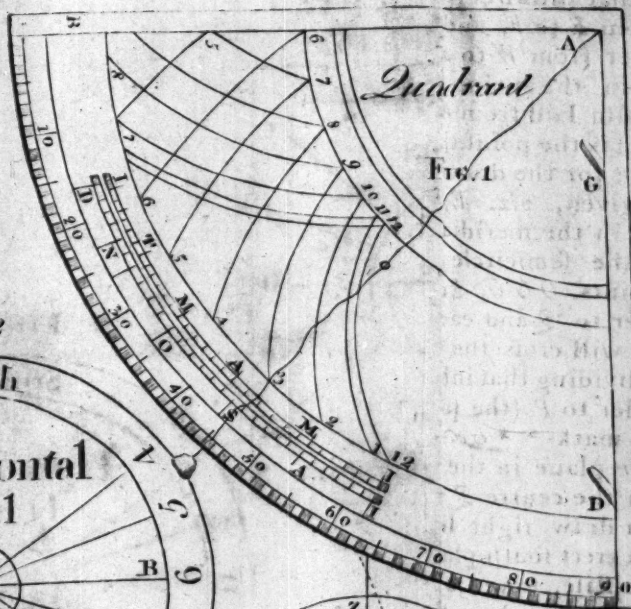
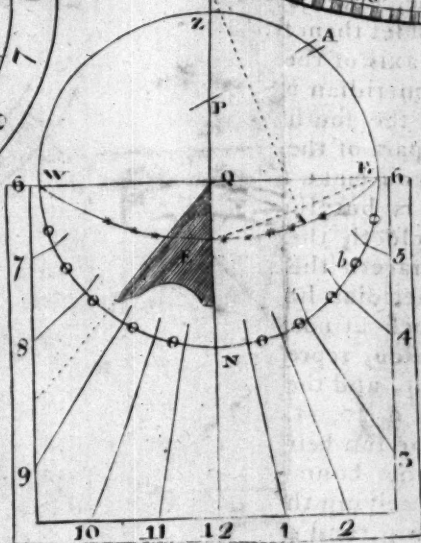


FIG. 3



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it is past 8 in the morning, and what it wants of 5 in the afternoon. See tab. 1. fig. 4.

To draw the hour-lines on an erect direct east or west plane.—Hour-lines in these dials must be parallel to one another, and the dial not have any centre, but drawn as follows. See tab 1. fig. 5.

Let $ABCD$ be the dial plane on which is to be drawn a direct east dial: upon the point D , if an east dial, and on the point C , if a west, with the radius (or chord of 60 degrees) describe the obscure arc EF ; then from your chords, take 38 deg. 28 min. the complement of the latitude of the place; and set them from E to F , and draw the line DF quite through the plane, then that you may proportion the stile to the plane, so that you may bring on all the hours from sun-rising to 11 o'clock, assume two points in the line FD , one towards the end D , (as the point G), for the hour-line of 11, and another at H , for the hour-line of 6; and through the points G and H , draw the lines 11 G 11, and 6 H 6; on the point G , with the chord of 60 degrees, describe the obscure arc IK ; and taking 15 degrees from the scale of chords, in the compasses, set one foot in I , and, with the other cut the arc IK in K ; through G and K , draw the line GKL , cutting the line 6 H 6 in the point L ; so shall LH be the height of the perpendicular stile proportioned to this plane.

For the drawing of the hour-line, set one foot of the compasses (opened to 60 degrees of the chords) in L , and with the other describe the arc MN , between the hour-line of 6, and the line GL ; which divide into five equal parts in the points $\odot \odot \odot \odot \odot$ and a ruler laid from the point L , to each of these points $\odot \odot \odot$, &c. will cut the equinoctial line HD in the points $* * * * *$; through which points draw lines parallel to 6 H 6, as the lines 7 * 7, 8 * 8, &c. as may be seen in the figure.

And thus you have made two dials, viz. a west dial as well as an east; only the arch EF , through which the equinoctial passeth in the east dial, is drawn on the right hand of the plane; but in the west it must be drawn on the left; and the hour-lines 4, 5, 6, 7, 8, 9, 10, and 11, in the forenoon, on the east dial, must

be 8, 7, 6, 5, 4, 3, 2, and 1 in the afternoon, upon the west dial, as in the figure. See tab. 2. fig. 1.

The stile of the east or west dials, may be either a strait pin of the just length of the line HO in the other figure, which is equal to HL fixed in the point H , on the hour-line of 6, and exactly perpendicular to the plane, shewing the hours by the shadow of the apex, or very near the top thereof: or, it may be a plate of brass of the same breadth with the distance of the hour-lines of 6 and 3; which plate must be set perpendicular upon the hour-line of 6, and so it will shew the hour by the shadow of the upper edge thereof, as in the last figure.

Of beautifying and colouring dials.

First, the boards are to be brushed over with lintseed oil, thinly ground with Spanish brown, done over three or four times, (drying between each time), a little thicker each time with the colour; and this is called *priming*.

To make the fat oil for dials.

Boil red-lead and lintseed oil, and a little litherage of gold (about a pennyworth) together, till almost as thick as syrup; and when cold, and well settled, pour the clearest into a bottle or bladder for use.

The gold size for dials.

Mix fine ground yellow ochre with the aforesaid fat oil, to such a consistency, as, when used, it may settle smooth of itself.

A mixture for hour-lines.

Grind vermilion or lamp black with the fat oil.

To draw golden letters or figures for the hours.

First, draw them with a pencil dipt in the gold size before mentioned; which when so dry as just to stick to your fingers, then with a smooth-edged pen-knife shape your leaf gold to your mind; take it up with a piece of cotton-cloth fixed to the end of a stick, and lay it on the size, pressing it down with the same cotton, and, when dry, brush off the loose gold with a feather, and smooth the rough edges of the letters with a pencil dipped in red or black colour.

Of the dial plane.

Let the board be of the best seasoned, firmest, clearest oak, one, two, or more feet square, and about three inches thick. Take two boards, and get them planed on both sides, and then laid in the sunshine, or near a moderate fire 2 or 3 days together; then plane them again, and fix them with good joints; and fasten them in gluing with wooden pegs, as I have seen coopers fix their pieces of heading for their casks; and when thus glued and dried, plane them again, and then fasten them, by nailing two small plates of iron or tin on the back. If you cannot get seasoned wood, but green, then boil it about an hour in water, to make it tough, and keep it from warping. In the general, wood is accounted better than stone, because it keeps the colouring more stanch or firm.

Before you colour your dial plate or board, fix your iron stile of 38 degrees, (which indifferently serves for all England); and having marked your hour-lines with ink, and fastened, a nail at the end of each hour-line, that the head of each nail may shadow or direct you to the centre when it is coloured. And as it may happen that golden letters or figures may decay in a few years, you may on that account make them with white-lead paint, pointed with red in a black margin. — When your dial is finished, and dry, dip a feather in your oil, and anoint it thinly; for the finer you mix or grind the colouring with the oil, the more beautiful it appears, though not so lasting.

These hints of colouring dials, put me in mind of some other necessary touches, relating to sundry mixtures of colours, and dying of stuffs, &c. collected from Mr Salmon's *Polygraphice*.

Of colours and dying.

Whites, are ceruse, flake white, and white-lead.

Blacks, are lamp-black, burnt cherry-stones, and old ivory burnt.

Reds are red lead, vermilion, red ochre, and Indian lake.

Greens, are verdigrease, verditure, and sap-green, made of the juice of buckthorn-berries.

Yellows, are saffron, yellow pink, and cambogia.

Brown,

Brown, is umber burnt.

Gold colour, is orpiment.

Again, *Verdigrease*, with a little sap-green, makes a good and a bright green.

Blues, are ultramarine, smalt, indico, and blue bice.

Of mixing colours.

Colours are mixed by being ground on a stone with fair water severally, and dried and kept in paper-bags for use, except lamp-black, saffron, smalt, gambogia, and sap-green.

Blue, to compound; tamper a little indico and smalt with oil.

A light blue; mix smalt and white-lead together.

Lead colour; mix lamp-black and white-lead together on a marble.

A fox colour, is umber burnt.

Gold colour, is orpiment mixed with fat oil, by a knife, on an earthen plate, or gally-tile rather.

To hinder colours from cracking, put oil of walnuts to them.

Yellow colour; beat saffron to powder, and steep it in vinegar.—Or take the yellow chives in white lilies and gum-water mixed for writing.

Red; vermilion with gum-water kept for writing.

Golden letters, to write; mix vermilion and gum-armoniac with yolk of eggs.

Of dying wool, stuffs, &c.

To dye *blue*, take woad 1 pound, and mix it with 4 pints of boiling water, and dip whites in it 24 hours.

To dye *red* of a clear colour, take 60 pints of water wherein bran has been steeped 24 hours; and when strained, dissolve 2 pounds of allom, and 1 pound of tartar; in which water boil what you have to dye for two hours; then take it out, and boil it in half as much fresh water, made of bran; viz. 30 pints, to which add madder, 3 pounds, and so perfect the colour with moderate warmth, without boiling.

To dye *green*, first make a yellow by the direction underneath; then take 60 pints of water wherein bran hath been soaked, asore said; then strain it, let 3 pounds of allom be dissolved in it, and then boil what you have to dye in it for two hours.

To

To dye yellow, take woad, 2 pounds of the said water of bran, and boil till the colour is good.

And if you would have the said yellow to be green, put the stuff into the aforesaid blue lye.

To dye a sad colour, add logwood to the black dye, before mentioned.

To dye linen or thread, &c. light red; take powder of Brazil and vermillion, of each one ounce boiled in allom water.

To dye linen or thread yellow; dissolve gambogia in allom water, &c.

To stain skins blue; boil elder-berries, and with the liquor bruth over the skins and wring them; then boil the berries in allom water, and wet them twice over.

Of Money.

THE current coin of this nation, is made either of copper, silver, or gold. Of copper are made the farthings and halipence. Of silver, the pennies, twopences, three pences, groats, sixpences, shillings, half-crowns, and crowns: but there is very little silver coined below the sixpence. Of gold is made the quarter-guinea, the half-guinea, the guinea, and the 5 guinea piece: besides, there are foreign pieces of gold, that pass, though with some scruple; as the Portuguese *moïdore*, at 27 s. pieces of 36 s. each; and others of 3 l. 12 s. There are also some few ancient pieces of gold of a pale colour, as being alloyed with silver, and therefore may be reckoned the best, and sometimes called angel or crown gold; whereas the old gold or broad pieces are mostly alloyed with copper, which makes them of a reddish colour.

Imaginary money.

We appropriate several names to money, of which there is no coin; as,

| | s. | d. |
|-----------------------------------|----|----|
| The pound of — — — — — | 20 | 0 |
| The mark — — — — — | 13 | 4 |
| The noble, or half-mark — — — — — | 6 | 8 |
| The angel — — — — — | 10 | 0 |

In England, accounts are kept in pounds, shillings, and pence Sterling; and their marks are derived from their names in Latin, viz. *l.* for *libra* or pounds, *s.* for *solidi*

solidi or shillings, *d.* for *denarii* or pence, *qr.* for *quadrantes* or farthings, 4 make a penny; and are expressed or set down thus: 4 *l.* 16 *s.* 8 *d.* 2 *qr.*

but better thus, *l.* 4 — 16 — 8½; the mark for pounds standing before the sum denominates the first number, and the others are known of course; for after pounds follow shillings, and after shillings succeed pence, &c. When the price of any thing is shillings and pence, it is set down thus: 4 *s.* 6 *d.*

or thus, 4/6; and when shillings and pence, and parts of a penny, expressed thus, 4 *s.* 6½ *d.* or thus, 4/6½. The latter way by some is accounted the neatest, and best method to express parts of a penny, or farthings; thus,

¼ a farthing, or one fourth part of what it follows.

½ a halfpenny, or one half of what it follows.

¾ three farthings, or 3-4ths, or qrs. of what it follows.

And being thus set fraction wise, the under figure shews how many parts the quantity before it is divided into, and the upper figure shews how many of those under parts the fraction stands for: as thus, ½ of an ell, ¾ of a foot, or 9 inches; and the same of a shilling is 9 pence; of a pound is 15 *s.*

If you are to set down 6 yards and half, write thus, 6½

Nineteen hundred three quarters thus, 19 C¾

Sixteen pounds and a quarter thus, 16 lb ¼

or else thus, 16 C ¼, 19 lb ¼, 5 feet ½, 14 days ¾.

Here the name is put between the whole number and the fraction, which I think is the plainer and better way: for example, 6½ hhds may, through ignorance or wilfulness, be read 6 half hhds, as well as 6 hhds and half; and at a certain place where I have had business, the wharfingers clerks expressed their half hhds in this manner.

Table of the value of gold and silver.

| | | | | | |
|--------|---|------------------|----|---|---|
| Gold | { | 1 Pound is worth | 48 | 0 | 0 |
| | | 1 Ounce | 4 | 0 | 0 |
| | | 1 Penny-weight | 0 | 4 | 0 |
| | | 1 Grain | 0 | 0 | 2 |
| Silver | { | 1 Pound is worth | 3 | 0 | 0 |
| | | 1 Ounce | 0 | 5 | 0 |
| | | 1 Penny-weight | 0 | 0 | 3 |
| | | 1 Grain | 0 | 0 | 1 |

A TABLE, exhibiting at one view the value of any number of Portugal pieces of gold, in English pounds and shillings.

| Num. of pieces | Portugal pieces. | | | | | | | | | | | |
|----------------------|------------------|----|----|--------------|----|----|--------------|----|----|-------------|----|----|
| | at 3 12 0 | | | at 1 46 0 | | | at 0 18 0 | | | at 1 7 0 | | |
| | l. | s. | d. | l. | s. | d. | l. | s. | d. | l. | s. | d. |
| 1 | 3 | 12 | 0 | 1 | 16 | 0 | | 18 | 0 | 1 | 7 | 0 |
| 2 | 7 | 4 | 0 | 3 | 12 | 0 | 1 | 16 | 0 | 2 | 14 | 0 |
| 3 | 10 | 16 | 0 | 5 | 8 | 0 | 2 | 14 | 0 | 4 | 1 | 0 |
| 4 | 14 | 8 | 0 | 7 | 4 | 0 | 3 | 12 | 0 | 5 | 8 | 0 |
| 5 | 18 | 0 | 0 | 9 | 0 | 0 | 4 | 10 | 0 | 6 | 15 | 0 |
| 6 | 21 | 12 | 0 | 10 | 16 | 0 | 5 | 8 | 0 | 8 | 2 | 0 |
| 7 | 25 | 4 | 0 | 12 | 12 | 0 | 6 | 6 | 0 | 9 | 9 | 0 |
| 8 | 28 | 16 | 0 | 14 | 8 | 0 | 7 | 4 | 0 | 10 | 16 | 0 |
| 9 | 32 | 8 | 0 | 16 | 4 | 0 | 8 | 2 | 0 | 12 | 3 | 0 |
| 10 | 36 | 0 | 0 | 18 | 0 | 0 | 9 | 0 | 0 | 13 | 10 | 0 |
| 20 | 72 | 0 | 0 | 36 | 0 | 0 | 18 | 0 | 0 | 27 | 0 | 0 |
| 30 | 108 | 0 | 0 | 54 | 0 | 0 | 27 | 0 | 0 | 40 | 10 | 0 |
| 40 | 144 | 0 | 0 | 72 | 0 | 0 | 36 | 0 | 0 | 54 | 0 | 0 |
| 50 | 180 | 0 | 0 | 90 | 0 | 0 | 45 | 0 | 0 | 67 | 10 | 0 |
| 60 | 216 | 0 | 0 | 108 | 0 | 0 | 54 | 0 | 0 | 81 | 0 | 0 |
| 70 | 252 | 0 | 0 | 126 | 0 | 0 | 63 | 0 | 0 | 94 | 10 | 0 |
| 80 | 288 | 0 | 0 | 144 | 0 | 0 | 72 | 0 | 0 | 108 | 0 | 0 |
| 90 | 324 | 0 | 0 | 162 | 0 | 0 | 81 | 0 | 0 | 121 | 10 | 0 |
| 100 | 360 | 0 | 0 | 180 | 0 | 0 | 90 | 0 | 0 | 135 | 0 | 0 |
| 200 | 720 | 0 | 0 | 360 | 0 | 0 | 180 | 0 | 0 | 270 | 0 | 0 |
| 300 | 1080 | 0 | 0 | 540 | 0 | 0 | 270 | 0 | 0 | 405 | 0 | 0 |
| 400 | 1440 | 0 | 0 | 720 | 0 | 0 | 360 | 0 | 0 | 540 | 0 | 0 |
| 500 | 1800 | 0 | 0 | 900 | 0 | 0 | 450 | 0 | 0 | 675 | 0 | 0 |
| 600 | 2160 | 0 | 0 | 1080 | 0 | 0 | 540 | 0 | 0 | 810 | 0 | 0 |
| 700 | 2520 | 0 | 0 | 1260 | 0 | 0 | 630 | 0 | 0 | 945 | 0 | 0 |
| 800 | 2880 | 0 | 0 | 1440 | 0 | 0 | 720 | 0 | 0 | 1080 | 0 | 0 |
| 900 | 3240 | 0 | 0 | 1620 | 0 | 0 | 810 | 0 | 0 | 1215 | 0 | 0 |
| 1000 | 3600 | 0 | 0 | 1800 | 0 | 0 | 900 | 0 | 0 | 1350 | 0 | 0 |
| 5000 | 18000 | 0 | 0 | 9000 | 0 | 0 | 4500 | 0 | 0 | 6750 | 0 | 0 |
| 10000 | 36000 | 0 | 0 | 18000 | 0 | 0 | 9000 | 0 | 0 | 13500 | 0 | 0 |

A TABLE for buying or selling any commodity by the great hundred, which is 112 pounds.

| d. q. | l. s. d. | d q. | l. s. d. | d. q. | l. s. d. | d. q. | l. s. d. |
|-------|----------|-------|----------|-------|----------|-------|----------|
| 0 | 0 2 4 | 12 | 18 4 | 1 | 5 14 4 | 1 | 8 10 4 |
| 20 | 4 8 | 23 | 0 8 | 2 | 5 16 8 | 2 | 8 12 8 |
| 30 | 7 0 | 33 | 3 0 | 3 | 5 19 0 | 3 | 8 15 0 |
| 1 00 | 9 4 | 7 03 | 5 4 | 13 0 | 6 1 4 | 19 0 | 8 17 4 |
| 10 | 11 8 | 13 | 7 8 | 1 | 6 3 8 | 1 | 8 19 8 |
| 20 | 14 0 | 23 | 10 0 | 2 | 6 6 0 | 2 | 9 2 0 |
| 30 | 16 4 | 33 | 12 4 | 3 | 6 8 4 | 3 | 9 4 4 |
| 2 00 | 18 8 | 8 03 | 14 8 | 14 0 | 6 10 8 | 20 0 | 9 6 8 |
| 10 | 1 0 | 13 | 17 0 | 1 | 6 13 0 | 1 | 9 9 0 |
| 20 | 3 4 | 23 | 19 4 | 2 | 6 15 4 | 2 | 9 11 4 |
| 30 | 5 8 | 34 | 1 8 | 3 | 6 17 8 | 3 | 9 13 8 |
| 3 00 | 8 0 | 9 04 | 4 0 | 15 0 | 7 0 0 | 21 0 | 9 16 0 |
| 10 | 10 4 | 14 | 6 4 | 1 | 7 2 4 | 1 | 9 18 4 |
| 20 | 12 8 | 24 | 8 8 | 2 | 7 4 8 | 2 | 10 0 8 |
| 30 | 15 0 | 34 | 11 0 | 3 | 7 7 0 | 3 | 10 3 0 |
| 4 00 | 17 4 | 10 04 | 13 4 | 16 0 | 7 9 4 | 22 0 | 10 5 4 |
| 10 | 19 8 | 14 | 15 8 | 1 | 7 11 8 | 1 | 10 7 8 |
| 20 | 2 0 | 24 | 18 0 | 2 | 7 14 0 | 2 | 10 10 0 |
| 30 | 4 4 | 35 | 0 5 | 3 | 7 16 4 | 3 | 10 12 4 |
| 5 00 | 6 8 | 11 05 | 2 8 | 17 0 | 7 18 8 | 23 0 | 10 14 8 |
| 10 | 9 0 | 15 | 5 0 | 1 | 8 1 0 | 1 | 10 17 0 |
| 20 | 11 4 | 25 | 7 4 | 2 | 8 3 4 | 2 | 10 19 4 |
| 30 | 13 8 | 35 | 9 8 | 3 | 8 5 8 | 3 | 11 1 8 |
| 6 00 | 16 0 | 12 05 | 12 0 | 18 0 | 8 8 0 | 24 0 | 11 4 0 |

EXAMPLE.

First, at 5d. 2 q. the pound, what is the great hundred? Look in the table for 5 d. 2 q. in the first column and against it in the second you shall find 2 l. 13 s. 8 d. and so much will 112 pound cost. Again, if a hundred weight cost 4 l. 8 s. 8 d. find 4 l. 8 s. 8 d. and against it in the column towards the left hand, you will find 9 d. 2 q. and so much it is by the pound.

Note, For every farthing that one pound doth cost reckon two shillings and four pence, and that is the price of the great hundred.

| INTEREST at three per cent. | | | | | | | | | | | | | |
|-----------------------------|-------|--------------|----|----|----|--------------|----|----|----|---------|----|-----|----|
| Princi- pal. | | for one day. | | | | Thirty days. | | | | A year. | | | |
| | | l. | s. | d. | f. | l. | s. | d. | f. | l. | s. | d. | f. |
| L. | 1 | | | | | | | | | | | | |
| | 2 | | | | | | | 1 | | | | 1 | 2 |
| | 3 | | | | | | | 1 | 3 | | | 1 | 9 |
| | 4 | | | | | | | 2 | 1 | | | 2 | 4 |
| | 5 | | | | | | | 3 | | | | 3 | |
| | 6 | | | | | | | 3 | 2 | | | 3 | 7 |
| | 7 | | | | | | | 4 | | | | 4 | 2 |
| | 8 | | | | | | | 4 | 3 | | | 4 | 9 |
| | 9 | | | | | | | 5 | 1 | | | 5 | 4 |
| | 10 | | | | | | | 5 | 3 | | | 6 | |
| | 20 | | | | 1 | | | 11 | 3 | | | 12 | |
| | 30 | | | | 2 | | | 1 | 5 | 3 | | 18 | |
| | 40 | | | | 3 | | | 1 | 11 | 2 | | 1 | 4 |
| | 50 | | | | 1 | | | 2 | 5 | 2 | | 1 | 10 |
| | 60 | | | | 1 | | | 2 | 11 | 2 | | 1 | 16 |
| | 70 | | | | 1 | 1 | | 3 | 5 | 1 | | 2 | 2 |
| | 80 | | | | 1 | 2 | | 3 | 11 | 1 | | 2 | 8 |
| | 90 | | | | 1 | 3 | | 4 | 5 | 1 | | 2 | 14 |
| | 100 | | | | 2 | | | 4 | 11 | | | 3 | |
| | 200 | | | | 3 | 3 | | 9 | 10 | 1 | | 6 | |
| | 300 | | | | 5 | 3 | | 14 | 9 | 3 | | 9 | |
| | 400 | | | | 7 | 3 | | 19 | 8 | 3 | | 12 | |
| | 500 | | | | 10 | | 1 | 4 | 7 | 3 | | 15 | |
| | 600 | | | | 11 | 3 | 1 | 9 | 7 | | | 18 | |
| | 700 | | | | 1 | 1 | 3 | 1 | 14 | 6 | 1 | 21 | |
| | 800 | | | | 1 | 3 | 3 | 1 | 19 | 5 | 1 | 24 | |
| | 900 | | | | 1 | 5 | 3 | 2 | 4 | 4 | 2 | 27 | |
| | 1000 | | | | 1 | 7 | 3 | 2 | 9 | 3 | 3 | 30 | |
| | 2000 | | | | 3 | 3 | 2 | 4 | 18 | 7 | 2 | 60 | |
| | 3000 | | | | 4 | 11 | | 7 | 7 | 11 | 1 | 90 | |
| | 4000 | | | | 6 | 6 | 3 | 9 | 17 | 3 | | 120 | |
| | 5000 | | | | 8 | 2 | 2 | 12 | 6 | 7 | | 150 | |
| | 6000 | | | | 9 | 10 | 1 | 14 | 15 | 10 | 3 | 180 | |
| | 7000 | | | | 11 | 6 | | 17 | 5 | 2 | 2 | 210 | |
| | 8000 | | | | 13 | 1 | 3 | 19 | 14 | 6 | 1 | 240 | |
| | 9000 | | | | 14 | 9 | 2 | 22 | 3 | 10 | | 270 | |
| | 10000 | | | | 16 | 5 | 1 | 24 | 13 | 1 | 3 | 300 | |

| Princi- pal. L. | INTEREST at four per cent. | | | | | | | | | | | |
|-----------------------|----------------------------|----|----|-------------|----|----|---------|----|----|----|-----|-----|
| | for one day. | | | Thirty days | | | A year. | | | | | |
| | l. | s. | d. | f. | l. | s. | d. | f. | l. | s. | d. | f. |
| 1 | | | | | | | | 3 | | | 9 | 2 |
| 2 | | | | | | | | 1 | 2 | | 1 | 7 |
| 3 | | | | | | | | 2 | 1 | | 2 | 4 |
| 4 | | | | | | | | 3 | 1 | | 3 | 2 |
| 5 | | | | | | | | 4 | | | 4 | |
| 6 | | | | | | | | 4 | 3 | | 4 | 9 |
| 7 | | | | | | | | 5 | 2 | | 5 | 7 |
| 8 | | | | | | | | 6 | 1 | | 6 | 4 |
| 9 | | | | | | | | 7 | | | 7 | 2 |
| 10 | | | | 1 | | | | 7 | 3 | | 8 | |
| 20 | | | | 2 | | | | 1 | 3 | 3 | 16 | |
| 30 | | | | 3 | | | | 1 | 11 | 2 | 1 | 4 |
| 40 | | | | 1 | | | | 2 | 7 | 2 | 1 | 12 |
| 50 | | | | 1 | 1 | | | 3 | 3 | 1 | 2 | |
| 60 | | | | 1 | 2 | | | 3 | 11 | 1 | 2 | 8 |
| 70 | | | | 1 | 3 | | | 4 | 6 | 3 | 2 | 16 |
| 80 | | | | 2 | | | | 5 | 3 | | 3 | 4 |
| 90 | | | | 2 | 1 | | | 5 | 11 | | 3 | 12 |
| 100 | | | | 2 | 2 | | | 6 | 6 | 3 | 4 | |
| 200 | | | | 5 | 1 | | | 13 | 1 | 3 | 8 | |
| 300 | | | | 7 | 3 | | | 19 | 8 | 3 | 12 | |
| 400 | | | | 10 | 2 | | | 1 | 6 | 3 | 16 | |
| 500 | | | | 1 | 1 | | | 1 | 12 | 10 | 20 | |
| 600 | | | | 1 | 3 | 3 | | 1 | 19 | 5 | 1 | 24 |
| 700 | | | | 1 | 6 | 2 | | 2 | 6 | 0 | 1 | 28 |
| 800 | | | | 1 | 9 | | | 2 | 12 | 7 | 1 | 32 |
| 900 | | | | 1 | 11 | 2 | | 2 | 19 | 2 | 36 | |
| 1000 | | | | 2 | 2 | 1 | | 3 | 5 | 9 | 40 | |
| 2000 | | | | 4 | 4 | 2 | | 6 | 11 | 6 | 80 | |
| 3000 | | | | 6 | 6 | 3 | | 9 | 17 | 3 | 120 | |
| 4000 | | | | 8 | 9 | | | 13 | 3 | | 160 | |
| 5000 | | | | 10 | 11 | 2 | | 16 | 8 | 9 | 1 | 200 |
| 6000 | | | | 13 | 1 | 3 | | 19 | 14 | 6 | 1 | 240 |
| 7000 | | | | 15 | 4 | | | 23 | 0 | 3 | 1 | 280 |
| 8000 | | | | 17 | 6 | 1 | | 26 | 6 | 0 | 1 | 320 |
| 9000 | | | | 19 | 8 | 3 | | 29 | 11 | 9 | 1 | 360 |
| 10000 | | | | 1 | 11 | 1 | | 32 | 17 | 6 | 2 | 400 |

| INTEREST at five per cent. | | | | | | | | | |
|-----------------------------------|-------------|--|----|-------------|--|--|-------------|--|--|
| for one day. Thirty days. A year. | | | | | | | | | |
| Princi- pal. | l. s. d. f. | | | l. s. d. f. | | | l. s. d. f. | | |
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A hint of generals, or things proper to be known and remembered on proper occasions.

- A ream of paper, 20 quires.
- A quire of paper, 24 sheets.
- A bale of paper, 10 reams.
- A roll of parchment, 5 dozen, or 60 skins.
- A dicker of hides, 10 skins.
- Ditto of gloves, 10 dozen pair.
- A last of hides, 20 dickers.
- A load of timber unhewed, 40 feet.
- A chaldron of coals, 36 bushels.
- A hogthead of wine, 63 gallons.
- Ditto of beer, 54 gallons.
- A barrel of beer, 36 gallons.
- Ditto of ale, 32 gallons.
- A gross, 144 or 12 dozen.
- A weigh of cheese, 256 pounds.
- Days in a year 365, weeks 52, and hours 8766.
- Pence in a pound 240, farthings 960.
- An acre of land, 160 square poles, or perches.
- A last of corn or rape seed, 10 quarters.
- Ditto of potashes, cod fish, white herrings, meal, pitch and tar, 12 barrels.
- Ditto of flax and feathers, 17 C. of gun-powder, 2 barrels, or 2490 lb. of wool, 4368 lb.
- A tun of wine, 252 gallons; oil of Greenland, 252 gallons; and sweet oil of Genoa, 236 gallons.
- A tun in weight, 20 C. of iron, &c.; but of lead there but 19 C. and a half, called a fodder or fother.
- A todd of wool, 28 pounds.
- A pack of ditto, 364 pounds.
- A load of bricks, 500; and of plain tiles, 1000.
- A stone of fish, 8 lb.; and of wool, 14 lb. The same for a horseman's weight, and also hay; but pepper, cinnamon, and allom, have but $13\frac{1}{2}$ lb. to the stone.
- Ditto of glass, 5 pounds; and a seam of ditto, 24 stone.
- A truss of hay, 56 pounds; and a load of ditto, 24 trusses.

Note, New hay in June and August, ought to be sold for 10 pence the pound to the truss, as per statute of 2d of William and Mary, 1693.

A cade of red herrings, 500; and of sprats, 1000.
Iron and shot, 14 lb. to the stone.

Barrels of sundry commodities.

| | |
|---|-----------------------------|
| Anchovies, 30 lb. | Railins, 1 C. wt. |
| A double barrel, 60 lb. | Oil, 31 gallons and a half. |
| Nuts or apples, 3 bushels. | Spanish tobacco, 2 C. to |
| Potash or barilla, 200 lb. | 3 C. |
| White or black plates, 300. | Gunpowder, 1 C. wt. |
| Candles, 10 doz. lb. | Soap, 240 lb. |
| Salmon or eels, 42 gall. | Butter, 224 lb. |
| Figs, 3 qrs. 14 lb. to 2 C. $\frac{1}{4}$ | Herrings, 32 gallons. |

Things in wholesale trade bought and sold by the thousand.

| | |
|--|-----------------------------|
| Cuttle bones. | Bricks. |
| Oranges and lemons. | Clinkers or Flanders tiles. |
| Chair-nails. | Billets and leaves of horn. |
| Tacks and tenter-hooks. | Barrel-hoops. |
| Pomegranates and tazels. | Squirrel skins. |
| Goose-quills and thimbles. | Slate and hilling stones. |
| Pins and small needles by the 1000 dozens. | |

Things bought and sold at fix score to the hundred.

| | |
|----------------------------|----------------------------|
| Banks and barlings. | cole, ling, and New- |
| Barrel-pipe boards. | foundland fish, stock-fish |
| Bomspars and Bow-staves. | of all sorts. |
| Canspars and caprevans. | Ells of canvass, and most |
| Herrings and deal-boards. | foreign linens. |
| Nails, eggs, and cod-fish, | Hogthead staves. |

Of bonds, bills, indentures, letters of attorney, wills, and other useful writings.

Precedents of these are very necessary, not only for the understanding of them, but to know how to make them properly on occasion.

A bond from one to one.

K Now all men by these presents, that I Abraham Darmell, of the parish of St Sepulchre's in the city of London, Gentleman, am held and firmly bound to John Melver of the said city of London, Esq; in the sum of fifty pounds of good and lawful money of Great Britain

Britain, to be paid to the said John Mever, or to his certain attorney, his executors, administrators, or assigns; for the true payment whereof, I bind myself, my heirs, executors, and administrators, firmly by these presents sealed with my seal. Dated thistwenty-first day of January, in the eleventh year of the reign of our Sovereign Lord George the Third, by the grace of God, of Great Britain, France, and Ireland, King, defender of the faith, and so forth, and in the year of our Lord one thousand seven hundred and seventy-one.

The condition of this obligation is such, that if the above bounden Abraham Darmell, his heirs, executors, or administrators, do well and truly pay, or cause to be paid, to the above named John Mever, his executors, administrators, or assigns, the full sum of twenty-five pounds of good and lawful money of Great Britain, on the twentieth day of August next ensuing the date hereof, with the lawful interest thereof; then this obligation to be void, or else to remain, continue, and be in full force and virtue.

*Sealed and delivered
(being first duly
stamped) in the pre-
sence of*

Abraham Darmell. 9

Gregory Needy.
Thomas Trusty.

Note, The mark ©, in this and the forms subsequent, represents the seal, which in this, and all those in which it appears, ought to be affixed; the person who executes any of them (a will excepted, concerning which directions will be given in its place) is, in the presence of the witnesses, to take off the seal, (that is, the instrument with which the impression was made), and then taking the paper or parchment in his or her right hand, is to pronounce these words, I deliver this as my act and deed for the purposes within mentioned.

A bill with a Penalty.

K Now all men by these presents, That I John Jen
kins, of the city of Chichester, in the county of
Surrey, victualler, do acknowledge myself indebted to
Martin Moneyman of East Grinstead, in the county
aforesaid

aforefaid, graſtier, in the ſum of twenty pounds of good and lawful money of Great Britain, to be paid unto the ſaid Martin Moneyman, his heirs, executors, administrators, or aſſigns, in or upon the 29th day of September next enſuing the date hereof, without fraud or further delay : for and in conſideration of which payment well and truly to be made and done, I bind myſelf, my heirs, executors, and administrators, in the penal ſum of forty pounds, of the like lawful money, firmly by theſe preſents: in witneſs whereof, I have hereunto ſet my hand and ſeal this twenty-fifth day of March, in the eleventh year of the reign of our Sovereign King George the Third, and in the year of our Lord God 1771.

Signed, ſealed, and delivered in the preſence of
Titus Teſtimony.
Andrew Affidavit.

John Jenkins. ©

A ſhort bill or note of one's hand.

K Now all men by theſe preſents, That I Peter Pennyleſs, of the pariſh of St Saviour's, Southwark, in the county of Surry, blackſmith, do owe, and own myſelf to ſtand indebted to Robert Rich, of the pariſh of St Andrew, Holborn, in the county of Middleſex, Gent. in the juſt and due ſum of five pounds, of lawful money of Great Britain, which by theſe preſents I promiſe to pay unto him the ſaid Robert Rich, at or upon the ſixth day of October next enſuing the date hereof : for the true performance of which payment, well and truly to be made, and in witneſs hereof, I have ſet my hand to theſe preſents this fifth day of May 1771.

Peter Pennyleſs.

Among men of buſineſs the following form is commonly uſed, and is equally effectual in law.

I Promise to pay to Mr Robert Rich, or his order, the ſum of five pounds, five months after date, for value received, this fifth day of May 1771, by

Peter Pennyleſs.

This note is transferable to another, if Robert Rich writes his name on the back thereof ; but then if Peter Pennyleſs doth not pay it, Robert Rich is liable thereto.

A penal bill from two to one.

K Now all men by these presents, that we Laurence Luckless and Peter Pauper, both of the parish of Saint Dunstan, Stepney, in the county of Middlesex, weavers, do acknowledge and own ourselves to stand Indebted to Gabriel Greedy, of the parish of St Olave, Southwark, in the county of Surry, feltmaker, in the just and due sum of ten pounds, of good and lawful money of Great Britain, to be paid unto him the said Gabriel Greedy, his heirs, executors, administrators, or assigns, at or upon the thirteenth day of October next ensuing the date hereof, without fraud or further delay; for and in consideration of which payment well and truly to be made, we do bind our heirs, executors, and administrators, in the penal sum of twenty pounds of the like lawful money, firmly by these presents. In witness whereof, we have hereunto set our hands and seals, this sixteenth day of February, in the eleventh year of the reign of our Sovereign Lord King George the Third, &c. and in the year of our Lord one thousand seven hundred and seventy-one.

Signed, sealed, and delivered in the presence of
Wimbleton Witness.
Timothy Tellis.

Lau. Luckless. ©
Peter Pauper. ©

Note, That bills without penalty are of no more force or lasting than book-debts, as they are not sealed; yet they are esteemed better security, because the party's hand, if he contends, may be proved against him: but oft-times, on an adjustment of accounts, it is usual to have the party's hand to the book, which is as valid as the other; but, in my opinion, there ought to be a witness to either of them.

Note also, All obligations ought to be in English, and the words at length; they may be suited to any condition, by only altering the name or names, place or places of abode, title or titles, sum or sums of money, date, &c.

Every bond, letter of attorney, indenture, and other thing to which a seal is affixed, wills excepted, must, to render it effectual, be stamped with three sixpenny stamps.

Note, By a late act of parliament, a shilling stamp more is become necessary.

Thus

K

Thus you may proceed of yourself, and save the charge of going too far distant to a scrivener, or an attorney, here being no other charge necessary but the stamped paper, and your own trouble of writing.

A letter of attorney.

K Now all men by these presents, That I Charles Careful of Lowes, in the county of Suffex, apothecary, (for divers considerations and good causes me hereunto moving), having made, ordained, constituted, and appointed, and by these presents do make, ordain, constitute, and appoint, my trusty friend William Wagstaff, of Pemsey, in the county aforesaid, Gentleman, my true and lawfull attorney, for me, in my name, and to my use, to ask, demand, recover, or receive, of and from *A. B.* of Rye, in the said county, the sum of forty pounds; giving, and by these presents granting to my said attorney, my sole and full power and authority, to take, pursue, and follow such legal courses, for the recovery, receiving, and obtaining of the same, as I myself might or could do, were I personally present; and upon the receipt of the same, acquittances, and, other sufficient discharges, for me, and in my name, to make, sign, seal, and deliver; as also, one or more attorney or attorneys under him to substitute or appoint, and again, at his pleasure, to revoke; and further to do, perform, and execute for me, and in my name, all and singular thing or things which shall or may be necessary, touching and concerning the premises, as fully, thoroughly, and entirely, as I the said Charles Careful, in my own person, ought or could do in and about the same; ratifying, allowing, and confirming, whatsoever my said attorney shall lawfully do, or cause to be done, in and about the execution of the premises, by virtue of these presents: in witness whereof, I have hereunto set my hand and seal, the sixth day of May, in the eleventh year of the reign of our Sovereign Lord George the Third, by the grace of God, King of Great Britain, &c. and in the year of our Lord God one thousand seven hundred and seventy one.

A letter of attorney by a seaman.

K Now all men by these presents, That I Timothy Tarpaulin, mariner, now belonging to his majesty's

jeſty's ſhip the Rye, for divers good cauſes and conſiderations me thereunto moving, have, and by theſe preſents do make my truſty friend Henry Hearty, citizen and baker of London, (or my beloved wife Penelope Tarpaulin), my true and lawful attorney, for me, and in my name, and for my uſe, to aſk, demand, and receive, of and from the right Honourable the Treafurer and Paymaſter of his majeſty's navy, and the commiſſioners of prize-money, and whom elſe it may concern, as well all ſuch wages, and pay bounty-money, prize-money, and all other ſum or ſums of money whatſoever, as now are, and which hereafter ſhall and may be due, or payable unto me; alſo all ſuch penſions, ſalaries, ſmart-money, or all other money and things whatſoever, which now are, or at any time hereafter ſhall or may be due to me, for my ſervice, or otherwiſe, in any one of his majeſty's ſhip or ſhips, frigates or veſſels: giving and hereby granting, unto the ſaid attorney, full and whole power, to take, purſue, and follow ſuch legal ways and courſes, for the recovery, receiving, and obtaining, and diſcharging upon the ſaid ſum or ſums of money, or any of them, as I myſelf might or could do, were I perſonally preſent: and I do hereby ratify, allow, and confirm, all and whatever my attorney ſhall lawfully do, or cauſe to be done, in and about the execution of the premiſſes, by virtue of theſe preſents: in witneſs whereof, I have hereunto ſet my hand and ſeal, this twenty-second day of March one thouſand ſeven hundred and ſeventy-one, &c.

Timothy Tarpaulin. ©

A ſhort will in legal form.

IN the name of God, *Amen.* I William Weakly, of the city of London, haberdather, being very ſick and weak in [or, in perfect health of] body, but [or, and] of perfect mind and memory, thanks be given unto God; calling unto mind the mortality of my body, and knowing that it is appointed for all men once to die, do make and ordain this my laſt will and teſtament; that is to ſay, principally and firſt of all, I give and recommend my ſoul into the hand of Almighty God that gave it, and my body I recommend to the earth, to be buried in decent Chriſtian burial,

at

at the discretion of my executors: nothing doubting but at the general resurrection, I shall receive the same again, by the mighty power of God. And as touching such worldly estate wherewith it has pleased God to bless me in this life, I give, demise, and dispose of the same in the following manner and form.

First, I give and bequeath to Elisabeth, my dearly-beloved wife, the sum of five hundred pounds, of lawful money of England, to be raised and levied out of my estate, together with all my household goods, debts, and moveable effects.

Also, I give to my well-beloved daughter Elisabeth Weakly, whom I likewise constitute, make, and ordain the sole executrix of this my last will and testament, all and singular my lands, messuages, and tenements, by her freely to be possessed and enjoyed. And I do hereby utterly disallow, revoke, and disannul all and every other former testaments, wills, legacies, bequests, and executors, by me in any wise before named, willed, and bequeathed; ratifying and confirming this, and no other, to be my last will and testament. In witness whereof, I have hereunto set my hand and seal, this twelfth day of April, in the year of our Lord one thousand seven hundred and seventy-one.

Signed, sealed, published, pronounced, and declared by the said William Weakly, as his last will and testament, in the presence of us, who, in his presence, and in the presence of each other, have hereto subscribed our names.

Henry Hardy.

Samuel Short.

William Wortle.

The testator, after taking off the seal, must, in the presence of the witnesses, pronounce these words, *I publish and declare this to be my last will and testament.*

Note, If a will be already made, and the person hath a mind to alter it, but to add something more, there may be affixed the following codicil or schedule to it, and it will stand good in law, as part of the will.

Will. Weakly. ©

A codicil to a will.

Be it known to all men by these presents, That I William Weakly, of the city of London, haberdasher, have made and declared my last will and testament in writing, bearing date the twelfth day of April one thousand seven hundred and seventy-one. I the said William Weakly, by this present *codicil*, do ratify and confirm my said last will and testament, and do further give and bequeath unto my loving cousin and godson William Weakly, junior, the sum of fifty pounds of good and lawful money of England, to be paid unto him the said William Weakly, by my executrix, out of my estate: and my will and meaning is, that this *codicil* be adjudged to be a part and parcel of my last will and testament; and that all things therein mentioned and contained, be faithfully and truly performed, and as fully and amply in every respect, as if the same were so declared and set down in my said last will and testament. Witness my hand this twentieth day of April one thousand seven hundred and seventy-one.

*Signed in the presence
of us*

William Weakly.

A. B.

C. D.

A deed of gift.

TO all people to whom these presents shall come, I George Generous do send greeting. Know ye, That I the said George Generous, of the parish of Pancras in the county of Middlesex, brick-maker, for and in consideration of the love, good will, and affection which I have and do bear towards my loving sister, Sarah Sorrowful, of the same parish and county, widow; have given and granted, and by these presents do fully give and grant unto the said Sarah Sorrowful, her heirs, executors, or administrators, all and singular my goods and chattles, now being in my present dwelling-house in the parish aforesaid, known by the name of Fisher's figgery; of which (before the signing of these presents) I have delivered her, the said Sarah Sorrowful, an inventory signed with my own hand, and bearing even date, to have and to hold all the said goods and chattels in the said premises or dwelling-house, to her the said

Sarah

Sarah Sorrowful, her heirs, executors, or administrators from henceforth, as her and their proper goods and chattels absolutely, without any manner of condition. In witness whereof, I have hereunto put my hand and seal, this tenth day of April one thousand seven hundred and seventy-one.

Signed, sealed, and delivered in the presence of

George Generous, @

Daniel Drayton.

Aaron Atkins.

Note, *This precedent may be extended to the giving away of cattle, corn, house, or land, if not entailed, &c. but the particulars must be named, &c.*

An indenture of apprenticeship.

THis indenture witnesseth, That Richard Reynolds, son of Robert Reynolds, late of Pempsey, in the county of Sussex, hath put himself, and by these presents doth voluntarily put himself apprentice to Charles Carpenter citizen and linendraper of London, to learn his art, trade, or mystery, and after the manner of an apprentice to serve him from the day of the date hereof, for and during the full term of seven years next ensuing: during all which time, he the said apprentice his said master shall faithfully serve, his secrets keep, his lawful commands every where gladly obey. He shall do no damage to his said master, nor see it to be done by others, without letting or giving notice thereof to his said master. He shall not waste his said master's goods, nor lend them unlawfully to others. He shall not commit fornication, nor contract matrimony within the said term. At cards, dice, or any unlawful game, he shall not play, whereby his said master may be damaged. With his own goods, or the goods of others, during the said term, without licence of his said master, he shall neither buy nor sell. He shall not absent himself day nor night from his said master's service without his leave; nor haunt alehouses, taverns, or play-houses; but in all things behave himself as a faithful apprentice ought to do, during the said term. And the said master shall use the utmost of his endeavours to teach, or cause to be taught and instructed, the said apprentice in the trade and mystery he now profess-

G g

eth,

Sarah

eth, occupieth, or followeth; and procure and provide for him the said apprentice, sufficient meat, drink, apparel, washing, and lodging, fitting for an apprentice, during the said term. And for the true performance of all and every the said covenants and agreements, either of the said parties bind themselves unto the other by these presents. In witness whereof, they have interchangeably put their hands and seals this 16th day of April, in the fifth year of the reign of our Sovereign Lord George III. by the grace of God, King of Great Britain, &c. and in the year of our Lord God one thousand seven hundred and seventy-one.

Note, If an apprentice be inrolled before a justice of the peace, or other proper officer, (the chamberlain being such in London), he cannot sue out his indenture, but upon proof of unmerciful usage, want of victuals, and other necessities, or his master's being incapable of teaching him his trade, or not causing it so to be done at his proper charge by others. And the same holds good in relation to a mistress. But there being no inrollment, an indenture may be sued out without shewing cause, in cities and corporations, &c.

A general release.

KNow all men by these presents, That I Peter Peaceable of Hastings, in the county of Suffex, tobaccoist, have remised, released, and for ever quit claim to William Winter of Rye, in the county aforesaid, fish-chapman, his heirs, executors, and administrators, of all, and all manner of action and actions, suits, bills, bonds, writings, debts, dues, duties, accounts, sum and sums of money, leases, mortgages, judgments by confession or otherwise obtained, executions, extents, quarrels, controversies, trespasses, damages, and demands whatsoever, which by law or equity, or otherwise soever, I the said Peter Peaceable, against the said William Winter, ever had, and which I, my heirs, executors, or administrators, shall or may claim, challenge, or demand, for or by reason, means, or colour of any matter, cause, or thing whatsoever, to the day of the date of these presents. In witness whereof, I have hereunto set my hand and seal, this fifteenth day of April, &c.

Peter Peaceable.

The complete GARDENER; or, The practice of gardening in all its branches, for the twelve months of the year.

J A N U A R Y.

Pleasure-garden.

Frost is to be expected now, and nothing is so dangerous to tender flower-roots, and their shoots for spring.

Ranunculuses, anemonies, and tulips, will be in danger: cover the beds to guard them, lay on pease-straw where they are not come up; but where the shoot appears, place hoops with mats and cloths upon them. This is the common practice; but in that excellent work, *The complete body of gardening*, lately published, there is a new method proposed, and much easier and better. This is to place behind them a reed-hedge, sloping three feet forward. A mat is to be let down from the top in severe weather, and taken up in mild. This certainly preserves them, and yet does not draw them weak, or make them tender.

Cover the beds and boxes, of seedling flowers, and take off the defence when the weather is milder.

Clean the auricula-plants, pick off dead leaves, and scrape away the surface of the mould; put fresh mould in the place of it, and set the pots up to the brim in the mould of a dry bed, and place them behind a reed-hedge.

Cover carnation-plants from wet, and defend them from mice and sparrows.

Kitchen-garden.

Throw up some new dung in a heap to heat, that it may be ready to make hot-beds both for the early cucumbers, and melons, in this part of the ground, and for raising seeds of annuals in the flower-garden.

Dig up the ground that is to be sown with the spring-crops, that it may lie and mellow.

Nurſe the cauliflower-plants kept under glaſſes carefully; ſhut out the froſt, but in the middle of milder days let in a little air; pick off dead leaves, and gather up the mould about the ſtocks.

Make a ſlight hot-bed in the open ground, for young ſalleting, and place hoops over it, that it may be covered in very hard weather.

Plant out endive for seed into warm borders, earth and blanch celery.

Sow a few beans and pease, and seek and destroy snails, and other vermin.

Orchard and fruit-garden.

Fruit-trees, whether in orchards, or espaliers, or against walls, demand the same general management.

Cut out dead wood and irregular branches, clean the stumps and boughs from moss with a hollow iron: and repair espaliers, fastening the stakes and poles with nails and wire, and tying the shoots down with twigs of osier.

Place stakes by all new-planted trees; and cut grafts to be ready, laying in the earth under a warm wall.

F E B R U A R Y.

Pleasure-garden.

Make hot-beds for annual flowers with the dung laid up for that purpose, and sow them upon a good thickness of mould, laid regularly over the dung.

Transplant perennial flowers and hardy shrubs, Canterbury bells, lilacs, and the like. Break up and new-lay the gravel-walks. Weed, take, and clean the borders, and where the box of the edging is decayed, make it up with a fresh plantation.

Sow auricula and polyanthus seeds in boxes: these should be made of rough boards six inches deep, with holes at the bottom for the running off of water; they must be filled with light mould, and the seeds scattered thinly over the surface, then some more mould must be sifted over them a quarter of an inch thick, and they must be set where they may enjoy the morning-sun.

Plant out carnations into pots for flowering.

Kitchen-garden.

Dig and level beds for sowing radishes and onions, carrots and parsnips; and Dutch lettuce, leeks, and spinach, should also be sown now: also beets, farsley, sorrel, and marygolds, with any other of the hardy kinds.

Make up the hot-beds for early cucumbers, and sow cauliflower seeds, and some others.

Plant beans and sow pease; the best way in these useful things is to sow a new crop every fortnight, that

that if one succeeds and another fails, as will often be the case, there may still be a constant supply at the due season for the table. Plant kidney-beans upon a hot-bed for an early crop. The dwarf white and Battersea bean are the best sorts. They must have air in the middle of mild days when they are up, and once in two days they must be gently watered.

Transplant cabbages, plant out Silesia and coss lettuce from the beds where they grew in winter; and plant potatoes and Jerusalem artichokes.

Orchard and fruit-garden.

Most kinds of trees may be pruned, though it be better to do it to the generality in autumn; whatever has been omitted at that season in this article must be done now, the hardiest kinds being pruned first, and such as are more tender at the latter end of the month, when there will be little danger of their suffering from the frosts in the wounded part.

Transplant fruit-trees to places where they are wanted; opening a large hole, settling the earth carefully about their roots, and nailing them at once to the wall, or fastening them up to strong stakes. Nail up the tenderer trees with care, and uncover the fig-trees by degrees which have been protected from frost by mats. Sow the kernels of apples, and pears, and the stones of plumbs, for stocks, and keep off birds that eat the buds of fruit-trees.

M A R C H.

Pleasure-garden.

Watch the beds of tender flowers, and draw mats over them supported by hoops in hard weather.

Continue transplanting all the hardy perennial fibrous-rooted flowers, sweet-williams, golden rods, and the like.

Dig up the earth with a shovel about those which were planted in autumn, and clean the ground between them.

All the pots of flowering plants must now be dressed. Pick off dead leaves, renew the earth at the top, and put fresh in the place, then give them a gentle watering, and set them in their places for flowering. In doing this, take care the roots are not wounded, and repeat the watering once in three days.

The third week in March is the time to sow sweet-pease, poppies, catchflies, and all the hardy annual plants.

The last week is proper for transplanting ever-greens; and for this purpose a showery day should be chosen. New hot-beds must be made to receive the seedlings of annual flowers raised in the former.

Kitchen-garden.

Sow in the beds of the kitchen-garden some carrots, and also the larger pease, rouncivals, and grey.

In better ground sow cabbages and favoys, also carrots and parsnips for a second crop, and towards the end of the month put in a large parcel of beans and pease.

Sow parsley and plant mint.

Sow coss and imperial lettuce; and transplant the finer kinds.

In the beginning of the month sow Dutch parsley for the roots.

The last week take the advantage of time or the dry days, and make asparagus beds.

Clear up the artichoke roots, slip off the weakest, and plant them out for a new crop, leaving four from each good root to bear; and from such as are weaker two.

Dig up a warm border, and sow some French beans. Let them have a dry soil; and give them no water till they appear.

Orchard and fruit-garden.

The grafts which were cut off early, and laid in the ground to be ready for use, are now to be brought into service: those of the earliest kinds are to be used first, and the apple last of all.

This done, let the gardener look to the stocks that were inoculated the last year, and take off their heads. A hands-breadth should be left on above the place: this holds the bud secure by tying to it, and the sap rises more freely for its nourishment.

The fruit-trees that were planted last October must be headed; and they should be cut down to almost four eyes. Some leave only three; but four is much better, the sap rises more freely.

A P R I L.

Pleasure-garden.

Tie up the stalks of tall flowers to sticks, cut these

two feet long, thrust them eight inches into the ground, and let them be hid amongst the leaves.

Clean and rake the ground between them.

Take off the slips of auriculas, and plant them out carefully for an increase. Transplant perennial flowers and evergreens as in the former months; and take up the roots of colchicums and other autumnal bulbous plants.

Sow French honeysuckles, wall-flowers, and other hardy plants upon the natural ground; and the tenderer kinds on hot-beds. Transplant those sown last month into the second hot-beds. Plant some tuberose in a moderate hot-bed: and sow carnations and pinks on the natural ground on open borders.

Kitchen-garden.

Plant the large crop of French beans; and choose for them a warm dry border. Plant cuttings of sage, and other aromatic plants. Sow marrowfat pease, and plant some beans for a late crop.

Sow thyme, sweet-marjoram, and savory.

Prepare dung for making ridges to receive the cucumber and melon plants designed for bell or hand-glasses.

Sow young sallading once in ten days; and sow some coss and Silesia lettuces.

The seeds of all kinds being in the ground, look to the growing crops. Clear away the weeds every where amongst them; and dig up the earth between the rows of beans, pease, and all other kinds that are planted at distances. This gives them a strong growth, and brings them much sooner to perfection than can be done by any other method.

Draw up the mould to the stalks of the cabbages and cauliflower plants; and in cold nights cover the glasses over the early cucumbers and melons.

Orchard and fruit-garden.

Look to the fruit-trees against walls and espaliers. Take away all foreright shoots, and train such as rise kindly.

Thin apricots upon the trees, for there are usually many more than can ripen; and the sooner this is done, the better the others succeed.

Water new-planted trees.

Plant cuttings of vines, and look over the grown ones.

ones. Nip off improper shoots. When two rise from the same eye, always take off the weakest.

Weed strawberry beds; cut off the strings; stir the earth between them; and once in three days water them.

Dig up the earth in the borders near fruit-trees. Never plant any large kinds of flowers or kitchen things upon them: and it is better if nothing be sown or planted on these borders; they all starve the fruit.

M A Y.

Pleasure-garden.

Observe when the leaves of fowbreads are decayed, and take up the roots, laying them carefully by till the time of planting.

Take up the hyacinth-roots which have done flowering, and lay them sideways in a bed of dry rich mould, leaving the stems and leaves out to die away; this practice greatly strengthens the roots.

Roll the gravel walks carefully and frequently, and keep the grass clean mowed.

Clean all the borders from weeds: take off all straggling branches from the large flowering plants, and train them up in a handsome shape.

Plant out French and African marygolds, with other autumnals from the hot-beds the last week of this month, chusing a cloudy warm day.

Tie up the stalks of carnations. Plant cuttings of the lychnis and lychnideas, and sow the small annuals candy-tuft and Venus' looking-glass in the open ground.

Pot the tender annuals, as balsams, amaranths, and the like, and set them in a hot-bed frame till summer is more advanced for planting them in the open ground.

Kitchen-garden.

Water once in two days the pease, beans, and other large growing plants.

Destroy the weeds in all parts of the grounds; and dig up the earth between the rows, and about the stems of all large kinds.

Sow small sallading once in ten days, as in the former month; and at the same time chuse a warm border, and sow some purslain; sow also endive, and plant beans and pease for a very late crop; and French beans to succeed the others. The great care in this kind is

to have these several products fresh and young throughout the season.

Chuse a moist day, and an hour before sun-set plant out some fivoys, cabbages, and red cabbage, draw the earth carefully up to their stems, and give them a few careful waterings.

Orchard and fruit-garden.

If any fresh shoots have sprouted upon the fruit-trees and espaliers, or against walls, nip them off, and train the proper ones to the wall or poles, at due distances, and in a regular manner.

Look over the vines, and stop every shoot that has fruit upon it to three eyes beyond the fruit. Then train the branches regularly to the wall, and let such as are designed for next year's fruiting, grow some time longer; their leaves will give a proper shade to the fruit.

Water the new planted trees, and keep the borders, about the old ones clear: and finally pick off snails, and other vermin.

J U N E.

Pleasure-garden.

Choose the evening of a mild showery day, and plant out into the open ground the tender annuals hitherto kept in pots in the hot-bed frame; they must be carefully loosened from the sides of the pot, and shaken out with all the mould about them: a large hole must be opened for each; they must be placed upright in it, and when settled in the ground by a gentle watering, must be tied up to sticks.

Let pinks, carnations, and sweet-williams, be laid this month for an increase. Let the layers be covered lightly, and watered every other day a little a time.

The spring-flowers being now over, and their leaves faded, the roots must be taken up and laid by for planting again at a proper season. Snowdrops, winter aconite, and the like, are to be thus managed.

The hyacinth roots, laid flat on the ground, must now be taken up, the dead leaves nipped off, and the mould; and when clean, they must be laid upon a mat in an airy room to harden, and then laid by.

Tulip-roots must now be taken up also, as the leaves decay; and the like method must be followed with anemones and ranunculuses.

Cut

Cut the cups or pods of the carnations that are near blowing, in three or four places, that they may blow regularly.

Inoculate some of the fine kinds of roses.

Kitchen-garden.

Transplant the cauliflower plants sowed in May. Give them a rich bed and frequent waterings.

Plant out thyme and other savoury plants sown before, and in the same manner shade and water them.

Take the advantage of some cloudy weather to sow turnips; and if there be no showers, water the ground once in two days.

Sow brocoli upon a rich warm border, and plant out celery for blanching. This must be planted in trenches, a foot and a half deep, and the plants must be set half a foot asunder in the rows.

Endive should also be planted out for blanching; but in this the plants should be set fifteen inches asunder, and the same time some endive-seed must be sown for a second crop. Pick up snails; and in damp evenings kill the naked slugs.

Orchard and fruit-garden.

Repeat the taking off of foreright shoots upon wall and espalier trees, which are directed last month: and train proper branches to their situation, where they are wanted. Once again thin the wall-fruit; leave nectarines at four inches distance, and peaches at five; none nearer. The fruit will be finer, and the tree stronger for next year.

Inoculate the apricots, and choose for this operation a cloudy evening. Water new-planted trees, and pick up snails and vermin.

J U L Y.

Pleasure-garden.

Roll the gravel frequently, and mow the grass.

Clip box-edgings: cut and trim hedges; and look over all the borders; clearing them from weeds, and stirring up the mould between the plants.

Inoculate roses and jasmynes of all the kinds that require this propagation; and any of the other flowering shrubs.

Take up the roots of fritillaries, and martagons, and others of this sort, that are past flowering some time

Gather

Gather the seeds of flowers you design to propagate, and lay them upon a shelf in an airy room in the pods.

When they are well hardened, tie them up in paper-bags, and do not take them out of the pods till they are to be sown.

Lay pinks and sweet-williams, as the former, in earth. Cut down the stalks of those plants which have done flowering, and which you do not keep for seed; and tie up those now coming into flower to sticks, as we directed for the earlier kinds.

Sow lupines, larkspurs, and the like, on dry warm borders, to stand the winter and flower early next year.

Kitchen-garden.

Sow a crop of French beans to come in late, when they will be very acceptable.

Clear all the ground from weeds.

Dig between the rows of beans and pease; mow the ground also about the artichokes, and among the cabbage kinds.

Water the crops in dry weather.

Spinache-seed will be ready to be gathering now, as also that of the Welch onion, and some others; take them carefully off, and dry them in the shade.

Take up large onions, and spread them upon mats to dry in the winter.

Clear away the stalks of beans and pease, that have done bearing.

Watch the melons as they ripen, and give them very little water.

Water cucumbers more freely.

Orchard and fruit-garden.

Inoculate peaches and nectarines.

Take off all foreright shoots in the espalier and wall fruit-trees.

Hang vials of honey and water upon the fruit-trees, and look carefully for snails. Keep the borders where the fruit-trees stand clear from weeds, and stir the earth about them. This will greatly assist the fruit in ripening.

Look to the fruit-trees, that have been grafted and budded the last season. See that there are no shoots from the stocks. Where-ever these rise, take them off; for they will rob the intended growth of its nourishment.

Lock

Look carefully to the new-planted trees ; water them often, and whatever shoots they properly make, fasten to the wall or espalier.

Repeat the care of the vines, take off improper shoots, and nail any that are loose to the wall. Let no weeds rise in the ground about them ; for they will exhaust the nourishment, and impoverish the fruit.

A U G U S T.

Pleasure-garden.

See whether the layers of sweet-williams, carnations, and the like, be rooted ; transplant such as are, and give frequent gentle waterings to the others to promote it.

Dig up the mellow-border, and draw lines at five inches distance, lengthwise and across : in the centre of these squares plant the seedling polyanthuses, one in each square.

In the same manner plant out the seedling auriculas. Shade them till they have taken root, and water them once in twenty-four hours.

Cut down the stalks of plants that have done flowering. Save the seeds you want as they ripen.

Water the tender annuals every evening.

Sow anemonies, and ranunculuses, as also fritillary, tulip, and narcissus seed.

Dig up a border for early tulip roots, and others for hyacinths, anemonies, and ranunculuses. Sow annuals to stand through the winter ; and shift auriculas into fresh pots.

Kitchen-garden.

Sow some spinach upon a rich border, and on such another sow onions. Those two crops will live through the winter, unless very severe, and be valuable in spring. The second week in August sow cabbage-seed of the early kinds ; and a week after that sow cauliflower-seed. This will afford the plants that are to be nursed up under bell-glasses in the winter. Some of these may also be ventured in a very well-defended situation open. The last week of this month sow another crop, to supply the place of these in case of accidents : for if the season be very severe, they may be lost, and if very mild, they will run to seed in spring. These last crops must be defended by a hot-bed frame, and they will stand out and supply deficiencies.

Sow lettuces, the cabbage and brown Dutch kinds, in a warm and well-sheltered piece of ground.

Transplant some of the lettuces sown earlier into warm and well-sheltered borders.

Take up garlick, and spread it on a mat to harden; in the same manner take up onions, and rocabole; and at the latter end of the month chalots.

Orchard and fruit-garden.

Watch the fruit on your wall-trees, and keep off devourers, of which there are numberless kinds now swarming about them. Shoot all birds, pick up snails, and hang bottles of sweet water for flies and wasps.

Fatten loose branches, and gather the fruit carefully as it ripens.

Once more go round the vines, and pull off those trailing branches so very luxuriantly produced at this time. See that the fruit is not shaded by loose branches, and keep the borders clear of weeds. This tends more than is imagined to the well ripening of the fruit.

S E P T E M B E R.

Pleasure-garden.

A new kind of work begins this month; which is, preparing for the next season. Tear up the annuals that have done flowering, and cut down such perennials as are past their beauty; bring in other perennials from the nursery-beds, and plant them with care at regular distances.

Take up the box-edgings where they are out-grown their proper size, and part and plant them fresh.

Plant tulips, and other flower-roots.

Slip polyanthus, and place them in rich shady borders.

Sow the seeds of flower-de-luce and crown-imperial, as also of auriculas and polyanthus, according to the method we delivered before.

Also part the roots of flower-de-luce, pienny, and others of these kinds. In the last week transplant hardy flowering shrubs, and they will be strong next summer.

Kitchen-garden.

Sow lettuces of various kinds, Silesia, Cos, and Dutch; and when they come up, shelter them carefully. The common practice is to shelter them under hand glasses;

but they will thrive better under a sloping reed-hedge, such as we described before.

Make up fresh warm beds with the dung that has lain a month in the heap. Plant the spawn in these beds upon pasture-mould, the same they were found in; and raise the top of the bed to a ridge, to throw off wet.

Look to the turnip-beds and thin them, leave the turnips at six inches distance.

Weed the spinache, onions, and other new-sown plants.

Transplant sage, lavender, and sweet plants. Earth up the celery as it grows up in height.

Sow young falleting upon warm and well-sheltered borders.

Clean asparagus beds in this manner; cut down the stalks, and pare the earth off the surface of the alleys, throw this upon the beds half an inch thick, and sprinkle over it a little dung from an old melon bed.

Dig up the ground where summer crops have ripened; and lay it in ridges for the winter. These should be disposed east and west, and turned once in two months; they have thus the advantage of a fallow.

Plant some beans, and sow some pease, on warm and well-sheltered borders, to stand out the winter.

Orchard and fruit-garden.

The fruit must now be gathered with care every day, and the best time is an hour after sun-rise. Then it should be laid in a cool place till used. Such as is gathered in the middle of the day, is always flabby.

Keep birds from the grapes; for as they now begin to ripen, they will be in continual danger.

Transplant gooseberries and currants; and plant strawberries and raspberries; they will be rooted before winter, and flourish the succeeding season.

O C T O B E R.

Pleasure-garden.

Let all the bulbous roots for spring-flowering be put into the ground, narcissus, marragon, tulips, and such ranunculuses and anemonies as were not planted sooner.

Transplant columbines, monkshood, and all kinds of fibrous-rooted perennials.

Place the auriculas and carnations that are in pots under shelter.

Some

Some lay the pots on one side, but that spoils the bud for next year's flowering. The best way is by means of a sloping reed-hedge. Dig up a dry border, and if not dry enough naturally, dig in some sand. In this set the pots up to the brim. Place the reed-hedge sloping behind them, and fasten a mat to its top that may be let down in bad weather.

Take off the dead leaves of the auriculas before they are thus planted.

Bring into the garden flowering shrubs where-ever they are wanted, and at the end of the month prune some of the hardier kinds.

Kitchen-garden.

Plant out the cauliflower-plants where they are to be sheltered; and it will be proper to plant two for each glass, where that method is used, for fear of one failing.

Sow another crop of pease, and plant more beans; choose for these a dry spot, and well-sheltered from the cold winds of winter.

Transplant the lettuces sowed last month, where they can be defended by a reed-hedge, or under walks.

Transplant cabbage-plants and coleworts where they are to remain.

Take great care of the cauliflower-plants sown early in summer; they now begin to shew their heads; break in the leaves upon them to keep off the sun and rain; it will both harden and whiten them.

Orchard and fruit-garden.

Prune the peach and nectarine trees and the vines. This is a very useful practice, for it strengthens the buds for spring.

Cut grapes for preserving, with a joint of the vine to each bunch.

Gather fruits for winter-keeping as they ripen. Transplant all garden-trees for flowering; prune currant bushes, and preserve the stones of fruit for sowing.

N O V E M B E R.

Pleasure-garden.

Throw together a good heap of pasture-ground, with the turf among it, to rot for mould for the borders.

Transplant honeysuckles and spireas, with other hardy flowering shrubs.

Rake over the beds of seedling flowers, and strew some pease-straw over them, to keep out the frost.

Cut down the stems of perennials which have done flowering; pull up annuals that are spent, and rake and clear the ground.

Place hoops over the beds of ranunculuses and anemones, and lay mats or cloths in readiness to draw over them in case of hard rains or frosts.

Clean up the borders in all parts of the garden, and take care to destroy not only weeds, but all kinds of moss.

Look over the seeds of those flowers, which were gathered in summer. See they keep dry and sweet, and in a condition of growth, and dig a border or two for the hardier kinds.

Kitchen-garden.

Weed the crops of spinach, and such other kinds as were sown late; for the wild growth will else smother and starve the crop.

Dig up a border under a warm wall, and sow some carrots for spring; sow radishes in such another place, and see the ground be well and deep dug for both. Turn the mould that was trenched and laid up for fallowing; this destroys the weeds, and prepares the soil to be enriched by the air.

Prepare some hot-beds for salleting. Cover them five inches with mould, and sow upon them some lettuces, and the common small salleting, mustard, rape, cresses, and radish.

Plant another crop of beans; and sow more pease for a succession.

Trench the ground between the artichokes, and throw a thick ridge of earth over the roots. This will preserve them from the frost, and prevent their shooting at an improper time.

Make a hot-bed for forced asparagus.

Take up carrots and parsnips, and lay them in sawdust to be ready for use. Give air at times to plants under hand-glasses and in hot-beds, or they will suffer as much by want of that, as they would have done by the frost.

Orchard and fruit-garden.

Stake up all trees planted for standards, or the winds will rock them at the bottom, and the frost will be let in and destroy them.

Throu

Throw a good quantity of pease straw about them, and lay on it a good quantity of brick-bats or pebbles to keep it fast; this will mellow the ground, and keep out the frost.

Continue to prune wall-fruit trees, and prune at this time also the apple and pear kinds. Pull off the late fruit of figs, it would decay and rot the branches.

D E C E M B E R.

Pleasure-garden.

Draw the mats and cloths over the ranunculus and anemomy beds in severe weather, whether frost or cold rains; but give them air in the middle of every tolerable day, and as soon as possible uncover them all day; but draw on the mats against night.

Throw up the earth where flowering shrubs are to be planted in spring; and once in a fortnight turn it.

Dig up the borders that are to have flower-roots planted in them in the spring, and give them the advantage of a fallow, by throwing up the ground in a ridge.

Scatter over it a very little rotten dung from a melon-bed, and after this turn it twice during the winter.

Look over the flowering shrubs and prune them. Cut away all dead wood, shorten luxuriant branches; and if any cross each other, take away one. Leave them so that the air can have free passage between them.

Sift a quarter of an inch of good fresh mould over the roots of perennial flowers whose stalks have been cut down, and then rake over the borders. This will give the whole an air of culture and good management, which is always pleasing.

Kitchen-garden.

Plant cabbages and favoys for seed. This is to be done with great care; dig up a dry border, and break the mould very well; then take some of the flousteil cabbage and favoy plants; hang them up by the stalks five days, and then plant them half-way of the stalk into the ground, draw up a good quantity of the mould about the part of the stalk that is out of the ground, and make it into a kind of a hill round each; then leave them to nature.

Sow another crop of pease, and plant another par-

cel of beans to take their chance for succeeding the others.

Make another hot-bed for asparagus, to yield a supply when the former is exhausted. Continue to earth up celery, and cover some endive with a good quantity of pease-straw, as it is growing, that you may take it up when wanted, which otherwise the frost will prevent.

Orchard and fruit-garden.

Prepare for planting trees where they will be wanted in spring, by digging the ground deep, and turning it well now in the places where they are to stand.

Scatter over the borders where the fruit-trees are planted some fresh mould, and some old dung, and in a mild day dig it in with a strong three-pronged fork.

Look over the orchard trees, and cut away superfluous and dead wood. Let the branches stand clear of one another, that the air can get between; and the fruit will be better flavoured.

This is the management of old trees, and new planted ones are to be preserved by covering the ground at their roots.

Instructions for marking on linen; how to pickle and preserve; to make divers sorts of wine of our English product; together with many excellent and approved medicines, salves, &c. necessary in all families.

AS many things have been spoken to, for the information of the younger sort of the male kind, so it may not be amiss to say some small matter in relation to the instruction and benefit of the female kind. And first,

Of marking.

This is indispensibly necessary and useful for the training up the younger sort of the female kind to the needle, it being introductory to all the various and sundry sorts of needle-work pertaining to that sex: therefore I have set down the alphabet in capitals, or great letters, and small, likewise the figures: that girls or young women, by often practice, may soon attain to perfection in marking on linen. The marking copies are as follows. See tab. 2.

Of pickling, preserving, candying, &c.

To pickle cucumbers.

Wash them, and dry them in a cloth; then take water, vinegar, salt, fennel-tops, some dill-tops, and a little mace; make it sharp enough to the taste; then boil it a while; then take it off, and let it stand till cold; then put in the cucumbers, and stop them down close, and within a week they will be fit to eat.

To pickle cucumbers green.

Take two quarts of verjuice or vinegar, and a gallon of fair water, a pint of bay salt, a handful of green fennel or dill; boil it a little, and when cold, put it into a barrel, and then put the cucumbers to the pickle, and you may keep them all the year.

To pickle French beans.

Take them while young, and cut off the stalks; then take good vinegar, and boil it with pepper and salt; season it to your palate, and let it stand till cold; then take the beans and put them into a stone-jar, placing dill between the layers, and then put in the pickle, and cover them close for three weeks; then take the pickle, and boil it again, and put it to the beans boiling hot; cover them close, and when cold, they will be fit to eat.

Or French beans may be pickled thus; take your beans and string them, boil them tender, then take them off, and let them stand till cold: then put them into pickle of vinegar, pepper, salt, cloves, mace, and a little ginger.

To pickle eldern, or any other buds of trees.

Give them one or two walms with vinegar, salt, whole pepper, long mace, and a little lemon-peel in pieces; then drain them, and let the buds and liquor cool separately; afterwards put them into a jar, and cover them with your pickle.

To pickle walnuts to eat like mangoes.

Take green walnuts before the shell is grown to any hardness in them; pick them from the stalks, and put them into cold water, and set them on a gentle fire till the outward skin begins to peel off; then with coarse cloths wipe it off; then put them into a jar, and put water and salt therein, lusing it once a-day for ten days, till the bitterness and discolouring of
the

the water be gone ; then take a good quantity of mustard-seed, which beat up with vinegar, till it becomes coarse mustard ; then take some cloves of garlick, some ginger, and a little beaten cloves and mace : make a hole in each nut, and put in a little of this ; then take white-wine vinegar, and boil them together, which put to the nuts boiling hot, with some pepper, ginger, cloves, and mace, as also some of the mustard and garlick, which keep close stopp'd for use.

To pickle mushrooms.

First blanch them over the crowns, and barb them beneath ; then put them into a pan of boiling water, then take them forth, and let them drain ; when they are cold, put them into your jar or glass, and put to them cloves, mace, ginger, nutmeg, and whole pepper ; then take white wine, a little vinegar, and salt : so pour the liquor into the mushrooms, and stop them close for use.

To pickle any sort of flowers for sallads, as clove-gilly-flowers, &c.

Put them into a gallypot, with as much sugar as they weigh : fill them with wine-vinegar : to a pint of vinegar, a pound of sugar.

To pickle samphire, broombuds, ashenkeys, purslain, &c.

Take samphire, and pick the branches from the dead leaves ; then lay it in a pot, and make a strong brine of water, and bay-salt : in the boiling scum it clean ; being boiled, and cold, put it to the samphire ; cover it, and keep it for all the year ; and when there is occasion to use it, take and boil it in fair water, but the water must boil before you put it in ; when it is boiled and become green, let it cool ; then take it out, and put it into a wide-mouthed glass, and put strong wine-vinegar to it, and keep it close for use.

To pickle lemon and orange peel.

Boil them in vinegar and sugar, and put them into the same pickle : observe to cut them in small long thongs, the length of half the peel of your lemon : it ought to be boiled in water, before it is boiled in vinegar and sugar.

To preserve green apricots.

Take them when they are small and tender ; peel them, and put them in hot water, but let them not boil ; let them lie there till they begin to be green ; then

then take them out, and put them in cold water; then boil your sugar, and let your apricots run a little of the water from them; then put them into the sugar, and let them boil till the syrup becomes thick; then put them into an earthen pan, and let them remain there a week; then put them into a preserving pan, and make them boil again till the syrup grows thick; then put them once more into an earthen pan, and let them stand till they are cold; then take them out of their syrup, and lay them on your ardoise; then dry them in your stove, and turn them often till dry; then put them in boxes on paper.

To preserve fruit green.

Take pippins, apricots, pears, plumbs, or peaches, when they are green; scald them in hot water, and peel them; then put them into another water, not so hot as the first; then boil them very tender, and take the weight of them in sugar, and put to them as much water as will make a syrup to cover them; then boil them somewhat leisurely, and take them up; then boil the syrup till it be somewhat thick, and when cold put them together.

To preserve raspberries.

Take good raspberries that are not too ripe, but very whole; take away the stalks, and put them into a flat-bottomed earthen pan: boil sugar, and pour it over your raspberries; then let them stand to be cool; and when they are cold, pour them softly into your preserving pan, and let them boil till their syrup be boiled pretty thick; scum them very well in the boiling; this done, put them in pots, and when cold, cover them up close for use.

To preserve barberries.

Take one pound of barberries picked from the stalks, put them in a pottle pot, and set it in a brass pot full of hot water, and when they be stewed, strain them, and put to the barberries $1\frac{1}{2}$ pound of sugar, and to them put a pint of red rose water, and boil them a little; then take half a pound of the fairest cloisters of barberries you can get, and dip them in the syrup while it is boiling; then take the barberries out, and boil the syrup till it is thick, and, when cold, put them in glasses with the syrup.

To preserve currants.

Lay a layer of currants, and then a layer of sugar, and so boil them as before prescribed for raspberries; scum them in boiling till the syrup is pretty thick; then take them off, and when they are cold, put them in gallypots or glasses closely stopped.

To preserve walnuts green.

Boil the walnuts till the water tastes bitter, then take them off, and put them in cold water; peel off the bark, and weigh as much sugar as they weigh, and a little more water than will wet the sugar; set them on the fire, and when they boil up, take them off, and let them stand two days, and then boil them again.

To preserve cherries.

First take some of the worst cherries, and boil them in fair water, and when the liquor is well coloured, strain it; then take some of the best cherries, with their weight in beaten sugar; then lay one layer of sugar, and another of cherries, till all are laid in the preserving pan; then pour a little liquor of the worst cherries into it, and boil the cherries till they are well coloured: then take them up, and boil the syrup till they will button on the side of a plate; and when they are cold, put them up in a glass close covered for use.

To candy cherries.

Take cherries before they be full ripe, and take out the stones: then take clarified sugar boiled to a height, and pour it on them.

To candy pears, plumbs, apricots, &c.

Take them, and give every one a cut half through; then cast sugar on them, and bake them in an oven as hot as for manchet, close stopped; let them stand half an hour, then lay them one by one upon glass plates to dry, and they will appear very fine and clear: in this manner you may candy any other fruit.

To candy flowers.

Pick them very clean, and to every ounce of flowers put two ounces of hard sugar, and one ounce of sugar-candy, and dissolve them in rose water; then boil them till they come to sugar again, and when it is almost cold, put in your flowers, and stir them together,

Of the making sundry sorts of English wines.

Currant-wine.

Pick the currants (when they are full ripe) clean from the stalks, then put them into an earthen vessel, and pour on them fair and clean hot water, that is, a quart of water to a gallon of currants; then bruise or mash them together, and let them stand and ferment; then cover them for twelve hours, strain them through fine linen into a large earthen crock, (as they say in Sussex), and then put the liquor into a cask, and thereto put a little ale-yest, and when worked and settled bottle it off; this is exceeding pleasant, and very wholesome for cooling the blood, in a week's time it will be fit for bottling.

Artificial claret.

Take six gallons of water, two gallons of the best cyder, and thereto put eight pounds of the best Malaga raisins bruised; let them stand close covered in a warm place for two weeks, stirring them every two days well together; then press out the liquor into a vessel again, and add to it a quart of the juice of barberries, and a pint of the juice of the bramble-berries or raspberries, (which perhaps is the best), to which put a pint of the juice of black cherries; work it up with mustard-seed covered with bread-paste for three or four days by the fire-side; after which let it stand a week; then bottle it off, and it will become near as good as, if not exceed, common claret.

Gooseberry wine.

The best way is to take to every three pounds of fruit, one pound of sugar, and a quart of fair water; boil the water very well, but you must put the afore-said quantity of sugar when it is boiled; bruise the fruit, and steep it twenty-four hours in the water; or it sometimes, then strain it off, and put the sugar in it, and let it stand in a runlet close stopped for a fortnight; then draw it off, and set it up in a cool cellar, and in two months it will be fit to drink.

Raspberry wine.

Take the raspberries clear from the stalks; to a gallon of which put a bottle of white-wine, and let them lie in an earthen vessel two or three days close covered; then bruise the berries in the wine, and strain through fine linen gently; then let it simmer over a moderate

moderate fire; scum off the froth, and then strain it again, and with a quarter of a pound of loaf-sugar to a gallon, let it settle; then in half a pint of white-wine boil about an ounce of well-scented cinnamon, and a little mace, and put the wine strained from the space into it, and bottle it up.

Damson wine.

Dry the damsons in an oven after you have drawn your bread, then to every quart of damsons put three quarts of fair water, but first boil it very well; then put the water and damsons into a runlet with sugar; and having stood a time sufficient, bottle it off.

Wine of grapes.

When they are fully ripe, in a dry day, pick off those grapes that are ripest, and squeeze them in a fat or press made for that purpose, in which must be a fine canvas bag to contain the grapes; and when in the press, do not squeeze them so hard as to break the stones, if you can help it, because the bruised stones will give the wine a disagreeable taste: then strain it well, and let it settle on the lees, in such a cask or vessel as you may draw it off without raising the bottom; then season a cask well with some scalding water, and dry it or scent it with a linen rag dipped in brimstone, by fixing it at the bouge, by the bung or cork; then put the wine into it, and stop it close for 48 hours; then give it vent at the bouge, with a hole made with a gimlet; in which put a peg or faucet, that may easily be moved with the fingers; then in about two days time close it up; and in about two or three months time it will be fit for drinking, and prove almost as good as French wine.

Wine of strawberries or raspberries.

Mash the berries, and put them into a linen bag, as abovesaid, for the grapes, and squeeze them into a cask, and then let it work as abovesaid in the grape-receipt, &c. In this manner may cherry-wine be made; but then you must break the stones, contrary to what was said before concerning the grapes.

A short way for cherry wine.

Squeeze the juice of cherries into a cask, and there to put a small quantity of sugar, corresponding to the quantity of juice; and when stood a month, it will be a pleasant liquor.

Black cherry-wine.

In the same manner, take a gallon, or more, of the juice of black cherries, and keep it in a vessel close stopped, till it works; and after it is fine, add an ounce of sugar to each quart, and a pint of white wine.

To make cyder.

Grind, stamp, or pound your apples, and put them into a press, and squeeze them through hair-bags into a tub; and let it settle, and, according to your quantity of juice, put in some sugar at discretion; then work it up with ale-yest, and let it stand a week; then prepare your vessels according to the quantity, clean and dry; then put it up; after which put into a bag two pounds of stoned raisins, two ounces of whole ginger, and two ounces of ising-glass, and see it tied tight with a strong string fixed without side the barrel, that the bag may sink to the bottom; and after two months it will be fit for use.

Mead.

Take six gallons of water, and thereto put six quarts of honey, stirring it till the honey be thoroughly mixed; then set it over the fire, and, when ready to boil, scum it very well; then put to it one quarter of an ounce of mace, and as much ginger, and half an ounce of nutmegs, some sweet marjoram, thyme, sweet briar, together, a handful; then boil them in the liquid, then let it stand by till cold, and then barrel it up for use.

Of jellies.

Let them be of apples, currants, raspberries, &c. Take out the clear liquor, (when squeezed), and boil it with sugar till it is as thick as a jelly; then put it up in glasses.

Family-Medicines.

Almonds of the ears fallen down.

Take a little bole armoniac in powder, and with it mix some Venice turpentine, and spread it on sheep's leather, as broad as a stay, and apply it under the throat, from ear to ear.

Ague.

Drink the decoction (that is, the boiling of any herb) of camomile, and sweeten it with treacle; which drink when warm in bed, and sweat two hours.

Or, to the wrists apply a mixture of rue, mustard, and chimney-foot, by way of plaster.

Asthmah, or shortness of breath.

Take a quart of aqua-vitæ, one ounce of anniseed bruised, one ounce of liquorice sliced, half a pound of stoned raisins, and let them steep ten days in the above-mentioned; then pour it off into a bottle, with two spoonfuls of fine sugar, and stop it very close.

St Anthony's fire.

Take a purge; and anoint the place with the marrow of mutton.

Bruise or scald outward.

Take a quart of neats-foot oil, half a pound of red lead, two ounces of bees wax; boil them together three hours, and stir them well.—Or, oil of eldern, bathed, or rubbed on the place, will have the same effect.

Bruises inward.

Drink the decoction of comfrey with bread and butter.

Bound in the body.

Take cream of tartar, mixed with honey, very frequently.

Piles or sores.

Eat rosemary and sage with bread and butter, and apply wheat-flower and honey by way of plaster.

Bloody-flux.

Take as much linen cloth as will make a suppository; being wrapped round button-wise, wet it in the best aqua-vitæ, or aqua composita; which properly applied, will help them in two or three applications. This is an approved and sure medicine.

Bleeding at the nose.

Put into your nostrils coney-wool rolled in bole-armeniack.

To purge the blood.

Drink often of the tea of groundivy, or of sassafras, chips.

Canker in the mouth.

Take the juice of plantane and rose-water mixed, and with it frequently wash your mouth.

For a cough.

When you are going to bed, drink brandy, treacle, and sallad oil, mixed: or, take a mixture of butter and brown sugar.

Convulsions

Convulsions in children.

Take unslaked lime one quart, and to it put five quarts of spring-water; let it stand 24 hours, in which time stir it three times, scum it, and take the clear water, and let it stand 12 hours more, and strain it through a cloth; and being put into an earthen pot, put to it anniseeds and fennel seeds of each a quarter of a pound; liquorice bruised, and saffras, of each an handful: let them stand four or five days, and then let the child drink a quarter of a pint morning and evening, as long as it lasteth.

Consumption.

Take as much new milk as a common still will hold, to which put the herbs following, viz. hyssop, cowslip-leaves, horehound, and colt's foot, of each an handful; and of maiden-hair one ounce; let them stand all night, then still them off; and when it is to be drank, sweeten it with syrup of cowslips, or good sugar.

Colic.

Beat the hips of wild roses (gathered in winter) into powder, and half as much sliced nutmeg; mix them, and take some in all your drink: this is an excellent remedy.

To cure drought in the ague.

Take a small quantity of burridge, sorrel, violet-leaves, and strawberry-leaves; seethe them in two quarts of fair running water till it consume to one quart; then take almonds and blanch them, and when beaten, put them to the said water, and to it put a little sugar, and drink it warm.

Drops.

Take broom-ashes, and mustard-seed, steeped in a pint of white wine; of which drink often. *Approved.*

For a sore throat.

Take columbines and cinisailoil, stamp them, and strain them into milk, and drink it very warm.

For the gripes.

Take a sliced nutmeg in a quartern of brandy warmed over the fire; to which put the beaten yolk of an egg, with a little water or sugar; stir them together over the fire to thicken a little: take it at night going to bed.

For the stone or stoppage of urine.

Take a quantity of thyme, parsley, tops of fennel,
and

and cinquefoil a little quantity, five or six cloves of garlick ; stamp them all together, and strain them into white wine or ale, and drink of it morning and evening.

To cause an appetite.

Seethe centaury in fair water, and drink it in a morning fasting, to the quantity of nine spoonfuls, lukewarm, for three days.

An easy and safe purge.

Take cream of tartar one ounce ; jalap and brimstone, of each a quarter of an ounce : the jalap must first be beaten into fine powder ; and mix them thoroughly together in a mortar ; but if the person be hard to work on, put two drams of jalap more.

Small-pox.

When warm in bed, drink mulled ale with marygold flowers, and sweat a little to bring them thoroughly out ; and to keep them from sinking, take brimstone and treacle.

For the itch.

Take frankincense, and beat it small, and mingle it with oil of bays, and therewith anoint all over.

For a burn or scald.

Take oil of eldein, and anoint the place : this is a sure remedy.

Against the fever.

Take a handful of bay-leaves, and a large handful of red-sage ; seethe them in two quarts of ale, till they come to one, and let the patient (being in bed) drink thereof a good draught warmed with a little sugar.

To make an approved ointment for old aches, &c.

Stamp smallage, and add to it some aqua-vitæ, and boar's greese ; stir them well together, and anoint the place before the fire evening and morning.

To make melilot excellent for plasters.

Take melilot, pimpernel, and scabious, of each two handfuls ; cut them small, then beat them in a mortar with two pounds of hog's lard ; let it stand in the sunshine seven or eight days, (it being usually made in June) ; then melt and strain it well ; then add as many more fresh herbs, and set it in the sun as before, and then melt and strain it again ; then boil it till the juice is consumed ; then take it off the fire, and
put

put to it beaten rosin, bees wax, and Venice turpentine, of each one ounce ; when cold, put it up in pots, or make it up in rolls.

A monthly list of all the fairs in England and Wales. In which all the moveable fairs are fixed to their certain days.

January 1. Charlbury. 5. Redbourn. 8. Preston. 10. Cawilton, Dronfield, Sleaford. 11. Howden, Salisb. 12. Lindover. 15. Pandvenog. Nottingham. 16. Pontefract. 17. Buckingh. Tavistock. 18. Banwell, Grampond, Melton-mowb. Potton, Teignmouth. 20. Banbury. 22. Banham. 24. Shefford. 25. Bingley, Bodmyn, Bristol, Chesterfield, Churchingford, Kington, Leighton, (Bedf.), Plymouth, Weasenham, Whittlesea, (isle of E.), 26. Adwalton, Knaresborough, Leek. 27. Rippon. 28. Langollen.

February 1. Higham-Ferrers, Reading. 2. St Blazey. Evesham, Farringdon, Liffon, Lyme, Lynn, Mart, Poulton, Rudland, Saltash, Wymondham. 3. Bale, Bath, Bromly, Dereham, Ermington. 5. Lanerchymead, Pontefract. 7. Capel St Silin, Howey. 8. Chirk, Egton, Hereford, Stamford. 9. Landaff. 10. Chapelin le Firth, Beverly. 11. Leybourn, Landysell. 12. Dorchester. 14. Ashborne, Beaconsfield, Beaumaris, Biddeford, Biggleswade, Brandon, Budworth, Camrass, Cardigan, Devils, Flint, Frampton, Godalming, Humbleton, Headon, Leominster. Looe, Maidit. Mold. Northallerton, Slaidburn, Tutbury. 17. Bridgnorth, Congleton, Stafford, Wokingham. 18. Long Preston. 19. South Moulton, Weldon. 21. Berkhamstead, Bingham, Colehill, (Staff. and Warw.), Liskeard, Litchfield, Northampton, Thirsk. 22. Botley, Bury (Lenc.), Cagewtley, Danbury, Hartley, Row, Stone, Tregony. 23. Bildestone, Campden, Dunstable, Eton, Exeter, Falkingham, Roylton, Tetbury, Tunbridge. 24. Ranbury, Canbrone, Eglwysfach, Frome, Henly (Oxon.), Ireby, Pocklington, Stoke (Suff.), Teignmouth, Walshall. 25. Ashbrittle, Burnham (Bucks), Carnary, Derby, Feverham, Llanerilio, Llandfechell, Onudle, Plympton, Ruabon, Westbury. 26. Adwalton. 28. Abingdon, Chertsey, Chesterfield, Winton.

March 1. Aldeburgh, Bedf. Colyford, Seaton. 2. Baldock, Brackley, Liphook. 3. Aunbury, Bridgewater, Fincham. 4. Charlbury, Frampton, Graftington, Stockport. 5. Bolingey, Titchfield, Tegaron, Wentage,

West-Looe. 7. Aberfraw, Blandford, Bourn, Buckingham, Burnley, Chipping Norton, Cortham, Frampton, Higham-Ferrers, Hingham, Kirkby Stephen, Langport, Nottingham. Tewksb. Uppingham. 10. Norton. 11. Camelford, Llandegla. 12. Gorwen, Langadock, Mydrim, South-bourn, Sudbury. Talgarth (Yorksh.) 14. Bradford (Yorksh.), Llandewy, Northop, Poole, Seaford, Stamford. 15. Bradford (Yorksh.), Burnham, (Nort.), Oakham, Oswestry. 16. Bettus, Caerwyth, Knaresborough. 17. Abbots-Bromley, Llangollen, Malmesbury. 18. Llanusydd. 19. Helston, Market Jew, Ruthen, Shrewsb. 21. Cerne, Fazely, Mold, Narbeth, Phillips-Norton, Salisb. Sedbergh, Stamford, Worktop. 22. Castle Cary, Howden, Leominst. Oakham. Stone (Staff.), 23. Aylham, Dolton, Retford, Skipton, Trure, Wrexham, Woburn. 24. Bromyard, Clithero, St Columb. Eccleshall, Keynham, Rippon, Upton, Wye. 25. St Alban's, Ash, Axbridge, Bishops Leydeard, Caerphilly, Chagford, Churchingford, Earls-Colne, Grampond, Great-Chart, Henly (Warwicksh.), Huntingdon, Malpas, Midhurst, Newark, Oxbrough, Rudland, Stockport, Watlington, Wigton, Woodstock, Woodbridge. 26. Andover, Bodmyn, Feckenham, Hertf. Montgom. Nampwich, Oldham, Walden. 28. Grantham Liskeard, Loughborough, Magor, Patrington, Philips, Norton, Preston (Lanc.), Wisbeach (isle E.) 29. Akecester, Chapline le Firth, Llangerniew, Newn, Stourbridge, Wellington (Salop.) 38. Market Drayton. 31. Durham, Newbridge, Ottery, Settle, Yarm.

April 1. Bishops Castle, Reeth, Snaith, Stevenage. 2. Abergely, Alnwick, Aylesbury, Hellstone, Hitchin, Llanidloes, Lutterworth, Malton, Newport (Shropsh.), Richmond, Shafisbury, Skipton, Wisbeach (isle E.) Worcester. 4. Ashborne, Belbroughton, Chesterf. Elham, Falkingham, Frettenham, Leebury, Magor, Minster, Nefyn, Poole (Montgom.), Swindon, Uipho. 5. Bangor, Blythburgh, Bootle, Bridport, Budworth, Burton, Cardigan, Clack, Colnbrook, Deal, Ditchling, Doncast. Elmham, Gloucester, Hailsham, Ichwell, Kingsclear, Lamberhurst (Kent), Lavendon, Ludlow, Moreton, St Peter's, Potton, Plympton, Somerton, Southwick, Tarring, Thirsk, Trecaastle, Wadley, near Farringdon, Wallingford, Wickwater. 6. Aberconway, Ivinghoe, Kington, Llanvylling, Newent, Uffculme. 7. Atherstone, Chapline le Firth, Llandyfell, Malmesbury, Maf-singham,

ingham, Norwich, Nottingh. Southminster, Ware-
ham, Wellington (Somerfeth.) 8. St Austle, Droitwich,
Grinton-Hackfield, High-Budleigh, Winbourn-Settle.
9. Burnley, Pontefract, Skipton. 11. Attleburgh, Bake-
well, Barnard-Castle, Boxford, Cockerham, Darlington,
Dilton-Marsh, Little Driffeld, Eham, Embsworth, Frin-
ginghoe, Gresford, Guilburn, Halesowen, Hockham,
Kegworth, Kelvedon, Kerley, Loddon, Manewden, Mit-
cheal-Dean, Newcastle, (Staff.), Olney, Romley, Shef-
ford, Sleasford, Thornbury, Warminster. 12. St Asaph,
Aibby de la Zouch, B. singtlocke-Downs, Bedale, Blake-
ny, Brails, Brede, Chipping, Cirencester, Clare, Cloeay-
nog, Colcheit. Daventry, Dedham, Dorchester. (Oxon).
Fordistreet, Fiewnn, Gainborough, Godmanchiter, Je-
venton, Milverton, Newport (Efl.), Perihore, Piddle-
toun, Rochford, Sanbach, Scole, Scotto, Selbey, Sid-
mouth, Skipton, Slaughtam, Slinfold, Tamworth,
Thame, Thornob, Totnefs, Toulham, Turner's-Hill,
Windfor. 13. Athill, Hartland, Heref. Holy-Cross, Leek,
Otterton, Redbourn, Royfton, Walton, Wellingbo-
rough, Witheridge. 14. Adwalton, Beccles, Caritreet,
Cowitone, Cheltenham, Cricklade, Dronfield, Ketter-
ing, Stamfordham, Whitney. 15. Barnstable, Beaulieu,
Derby, Northampt. Rothbury, Slaidburn, Taugley,
Yarmouth (Norf.) 16. Biggleswade, Brackley, Yarm.
(Norf.), Worcest. 18. Castle-Acre, Evesham, Llanelliom,
Padstow. 19. Blockley, Eleimere, Fenny Stratf. Skipton.
20. Downton, Northleach, Llandovery, Shrewsb. Sto-
ney-Stratf. 21. Beff. Chesham, Stamford Peverell. 22.
Allechurch, Bury (Lanc.), Newport Pagnell, Pontypool,
Settle. 23. Great Bedwin, Biliden, billey, Campden,
Chicheft. Cowbridge, Finchamstead, Gravesend, Hat-
field, Holywell, Iron-Acton, Modoury, Norleafe, Saw-
bridgeworth, Staraway, Witchurch (Hants). 25. Ash-
over, Axminit. Brachnell, Burnham (Efl.), Crowbo-
rough, Grassington, Guilborn, Holt (Norf.), Iron-
Acton, King's Norton, Lannerchymeadd, Lumpham,
Llandegla, Llanerwit, Loughborough, Lufon, Maid-
en-Bradley, Methwould, Montacute, Great Oakly, Or-
leton, Pocklington, Southampton. Stogumber, Toddington,
Warkworth, Wigmore. 26. Caerwith, Ovingham,
Settle, Somerton, Tamworth, Fenbury. 27. Abbertord,
Barrowbridge, Cerrigy-Drindion, Doritone, Down-
ham, Holciworthy, Spalding. 28. Auwalton, Soham.

29. Churchingford, Newchurch, Reeth. 30. Chapelin
le Firth, South-Moulton, Newmarket, (Flintsh.)

May 2. Little Brickhill, Burnham (Bucks), Castle-
cary, Charing, Cleobury-Mortimer, Cockermouth,
Collyton, Coventry, Crowcomb, Cullumpton, Derby,
Fowey, Gilsborough, Greenstreet, Harwich, Hazlemere,
Hope, Lancast. Lantissent, Laxfield, Lowestoff, North,
Petherton, Oldham, Penryn, Reading, Redruth, Ruf-
ford, Shoreham, Stockport, Stogursey, Stonehouse,
Tarperly, Totness, West Hadden, Wingham, Wirk-
worth, Wittertham. 3. Aldeburgh, Barton-Underwood,
Broadclift, Bromyard, Castle Hedingham, Chard, Coln-
brook, Hambledon, Heistbury, Higham-Ferrers, High-
bickington, Poulton, Tidswell, Tregony, Worestead.
4. Amphthill, Bewdley, Boston, Brecon, Callington,
Castlecoombe, Chagford, Cheddar, Chelsterf. Earith,
Elmstead, Frodsham, Gosp. Guilf. Harling, Henfield,
Hodnet, Ipsw. Lidney, Northallerton, Northam. North
Duffield, Nutley, Overton, Probus, Shapp, Tamworth,
Tanby, Torrington, Wilton, Wooburn, Wooler, Wot-
ton-Bal. Wrotham. 5. Caxton, Chorley, Llandrhiader,
Pentraeth Mon. Porloch. Tenterden. 6. Amersbury,
Bishops-Cattle, Bourn, Brigstock, Buckingham, Calne,
Castletoun, Chawley, Chipnam, Chipping, Norton,
Colehill, (Staff. and Warw.), Dunmow, Dursley,
Gwthrln, Halstead, Hunmanby, Kendall, Knaresbo-
rough, Knighton, Lewes, Lifs, Llannerchymedd,
Macclesfield, Meer, Nantglyn, Oakham, Pensford,
Pleasley, Risborough, Stallbridge, Settle, Stoke, Under
Hamden, Tavistock, Treganatha, Uttoxeter, Wem,
Wymondham. 7. Talybont. 9. Braintree, Crawley,
Deheuidd, Dudley, Guisburn, Hawarden, Hassingden,
Holdty, Horsebridge, Kighley, Market-Bosworth, Mat-
lock, Padiham, Stamford, Tockington. 10. Allen-
town, Caerleon, Egton, Fring, Harold, Leigh E. Skip-
ton, Solyhull. 11. Askrig, Cediton, Dewsbury, Dole-
gelly, Eglwyssach, Llanidlos, Staines, Worley-common.
12. Adwalton, Altriston, Alnwick, Andover, Bagbor-
west, Barnsley, Brading, Burgh, Burwash, Cawood,
Chelmsf. Coln, Congleton, Crose Castle, Crickhowel,
Everhot, Ewell, Falkingham, Haverford west, Haver-
hill, Heref. Lamborn, Lanusydd, Lavichangel, Ledbur-
ry, Leicester, Leighton, (Huntingtonsh.) Linfield,
Lingfield, Litchf. Little-mountain, Lyminster, Maidit.
Miltthorp,

Milthorp, Mold, Pains-Castle, Pembridge, Pentre, Penybert, Rippon, Rowland's Castle, Sherstone, Silchester, Stanstead, St Stephen's Stoke (Suff.), Storrington, Stow (Gloucestersh.), Stroud, Sturminster. Swaffham, Trefriw, Touchest. Tuxford, Wadebridge, Warwick, Wendover, Wenlock, Wivilscombe. 13. Blackheath, Brent, Burnley, Darley, Flash, Haverhill, Lansawell, Leominster, Leyborn, Oswestry, Pwllhely, Rippon, Sucklebridge, Waltham H. 14. Abergavenny, Arundel, Bala, Berkley, Barns Burnton, Bungy, Chelmsf. Chertsey, Denbigh, Elltow, Fairford, Goldanger, Guisburn, Haltwille, Hamstreet, Hartlepoole, Holloway, Newark, Nuneaton, Oakham, Pembroke, Pulham, (Norf.), Ramsbury, Rochdale, Staff. Strawford (Warwicksh.). Stretton Church, Tattershall, Tewksbury, Thetf. Titchfield, Towyn, Uckfield, Waltham-abbey, Weighton, Winchelsea, Woolbridge. 16. Benenden, Bettws, Caelgwrely, Carnarvon, Chatham, Eversley, Guisburn, Inglewhile, Llanernigew, Machynleth, Overton Roach, Winchcomb. 17. Ashford, Brentford, Bolney, Emergreen, Groombridge, Hay, Holebeach, Mattithal, North-Moulton, Newton, (Lanc.), Penrice, Rudham, Somerton. 18. Abergely, Alcester, Brentford, Dorstone, Handford, Kingsbrumpton, Leek, Llanfannan, Morpeth, Northleach, Westfield, Walsingham, Workington. 19. Attleburgh, Banbury, Bawtry, Beaconsfield, Beaumaris, Beccles, Beverly, Bildestone, Bishop Auckland, Blyth, Bottithal, Bovey-Tracey, Bow (Devon), Brentford, Bridge-end, Bridport, Brighthelmstone, Bures, Burton, Chappel-Cannon, Cerne, Chaplain le Firth, Cheadle, Cheltenham, Danehill, Devizes, Dicker, Enclethall, Ely, Eglewysfwrw, Farnham, Finden, Framden, Garstang, Grantham, Hallaron, Hanslope, Hawkthead, Helmsley-Black-Moor, Hereford, Handon, Kidderminster, Kilhampton, Kirbylonsdale, Langodock, Lifton, Litton, Liskeard, Llanelly, Mendlesham, Middlewich, St Neots, Newbury, Newp. (Monmouthsh.) North-Walsham, St Osyth, Petworth, Rippon, Ross, Saxmundham, Scarborough, Shefford, Southwick, Stelling, Stockbridge, Stone (Kent), Stortford, Straton, Sumer-Court, Three Lords, Trew, Ulverstone, Wellington, (Somerf.), Wemb, Weobly, Wetherby, Wigan, Winslow, Woodnesborough, Wrexham, Yarm, Yaxley. 20. Charbury, Rackham, Southminster,

minster, Stevenage, St Udney, Wellow, Wickham.
 21. Ashborn, Blackburn, Culmstock, East Church, Hatherleigh, Lamberhurst, (Suffex), Sellinge, Sherborne, Spotty, Treastle, Wainfleet, Weldon, Whitesmith.
 23. Abbots-Broomley, Albrighton, Appleshaw, Brastead, Bridlington, Broomhall, Criccieth, Dorking, Dunstable, Fletching, Grays, Guestling, Hallaton, Hindon, Horsham, Llandwnog, Maenclochog, Preston, (Kent), Ruabon, Sodbury, Spillsby, Swindon, Thorpe, Wisbeach, (isle E.), Whitham, Wragby. 24. Belford, Corwen, Huddersfield, Kidwely, Llanvylling, Louth, Mark, Marthfield, Testinivg, Woods Corner. 25. Abberford, Bodmyn, Cuckfield, Market-deeping, Newent, Sandhurst, Shrewsb. Spaldick. 26. Alston, Allwick, Brough, Camelford, Donnington, Kirkofwald, Malmesbury. 27. Chipping Norton, Horsted Keynes, Pett, Ruthyn, Thaxtead. 28. Appleby, Booth, St Germain's Malton, Nefyn, Newport (Salop), Norwich, Skipton, Stagshawbank, Wisbeach, (isle E.) 30. Ackhole, Amertham, Appleby, Ardingley, Bakewell, Battle, Berkhamstead, Biggleswade, Billinghurst, Binegar, Blackburn, Braughing, Brixworth, Bromyard, Newbuckingham, Bury Cartmell, Chichest. Coltilhall, Cranbrook, Cromer, Crowle, Darlington, Little-Dean, Little Driffeld, Dunster, Elham, Evesham, Exeter, Eye, Framlingham, Hadleigh, Ham near Richm. Harlow, Hawes, Helstone, Hampnall, Hitchin, St Ives (Hunt.), Kington, Landaff, Launceston, Lawhaden, Llanymyneck, Manchett. Marsh in the isle of Ely, Mayfield, Newcastle. (Staff.) Newport (Hants), Ormskirk, Oundle, Portbury, Rocheest. Rosleyhill, and every fortnight after, till Sept. 29. at ditto, Rothbury, Rotherham, Ruithton, Salisb. Sittingbourn, Sleaford, Southwell, Spillsby, Stoke (Suff.), Tarling Tollerdown, Turckey, Wallingham, Wandsworth, Warlop, Welling (Suff.), Wells, Westbury, (Wiltsh.), Westhoathley, Whitchurch (Salop), Whitedown, York.
 31. Alford, Ataby de la Zouch, Bampton (Devon.), Bedale, Binegar, Botley, Boxtead, Buckland, Callicary, Cogeshall, Cuckfield, Durham, Eastchurch, Elmere, Elmsett, Epping, Faringdon, Gisborough, Hatfield Pavarel, Hastings, Hempton, Henley (Warw.), Hingham, Great Hollingbury near Woodside green, Landover, Leighton (Bedf.), Lewes, Llangollen, Melford,

Melford, Melton-Mowb, Midhurst, Monmouth, Newark, Newmarket (Suff.), Ottery, Painswick, Pembury, Penrith, Purleigh, Rochdale, Salish, Stone (Staff.), Talgarth, Tenby, Tillingham, Waldershare, Walshall, Wandsworth, Warnham, Wetwoodbank near Wooler, West Mersey, Woodstock, Yardley.

June 1. Ambleside, Barnard Castle, Basingstocke, Caillei, Kirby, Moor-side, Lampeter, Leek, Lenton near Nottingham, Llandibea, Ludlow, Maidenhead, Minehead, Newick, Redbourn, Royston, Steple, South Harting, Truro, Wansworth, Wellingborough. 2. Adwalton, Alphington, Ashburton, Askrig, St Austle, Birmingham, Bow (Midd.), Buckingh. Dinasmondy, Henley, (Oxon), Kingston, Langtown, Latchington, Newport (Monm.), Odell, Upton, West-Cowes. 3. Bow (Midd.), Carmarthen, Cheptow. Derby, Hurst-green, Kingston, Mertham, Ryegate. 4. Balcomb, Booth, Kingst. Kirkham Y. Moreton-Hamstead, Narbeth, Norwich, Stockesly, Stowbridge. 6. Althorne, Bojam, Bradford, Burnham S. South-Cave, Dalton, Daventry, Dorchester, Gillingham, Great Tey, Hampton, Hounslow, Lenham, Messingham, Milbourn-Port, Ostend, Pembroke, Pontypool, Poole (Montgom.) Rayleigh, Rowell, Rudgwick, Seale, Southamp. Southwold, Sutton, Toddington, Usk, Watford, Williton, Windsor. 7. Abergavenny, Holywell, Montgom. Sheffield, Somerton, Sutton H. Swinehead, Watford, Weeton. 8. Aberfraw, Raven-Glass. 9. Caerwyth, Carphilly, Chapelin le Firth, Chirk, Christ-Church, Harlech, Kidderminster, Kilkhampton, Lannerchymead, Neath, Penzance, Steyning, Stortford, Thorpenear Egham, Weobly. 10. Berw. Coventry, Iugham, Pentraethmon, Tettinvig. 11. Amersbury, Axbr. Brandon. Chipman, Chidleigh, Gaywood, Grampond, Landwitt, Liphook, Menchmor, Newnham, (Glouc.), Overton, Stanford, Stanton, Stratf. Tolesham Darey, Workingham. 13. Banbury, Barton (Linc.), Bulton L. Bines-green, Clunn, Darlingt. Devizes, Hallaton, Havorsford west, St Neot's, Prescott, Ross, Whittle-sea (isle E.) 14. Ay-lest. Hailsham. 15. Brampton, Mannington, South-Moulton, Ramsey. 16. Falking, Frogatheath, Polstead, Wrexham. 17. St Alban's, Bradfield, Grimshy, Taunton, Thorne. 18. Chepstow, Rothersfield, Stockland. 20. Abingd.* Coleford, Howey, Maidst. Stamf. Whitechurch,

Whitechurch (Hants.) 21. Aldeburgh, Bishop Awk-land, Landilos, Llanwrst. New-Brough, Tiverton, Worktop. 22. Appledore, Bradfield, Bettws, Bletchingley, Brampton, Broadwater, Burrongh-bridge, Cross-in-hand, Halesowen, Hatherleigh, Havant Holt (Denb), Horncastle, Lambert castle, Ledbury, Macclesf. Hewburgh, Newcastle (Caerm.) Newport-Pegnell, Selmsby, Shipstone, Tewksb. Wadebridge, Wellington, (Salop), 23. Llandegla. 24. Alconbury, Arlesford, Barnet, Bentham, Boughton, Bradwell, Bridgewater, Broomsgrove, Cambridge, Canewden, Colchest Debenham, Farnham, Flint, Franfield, Glemsford, Hadleigh, Halifax, Kirkham (Lancash.), Leighton (Yorksh.), Moor-Kirk, Much-hadham, Newn, Newton-Abbot, Oxford, Preisteign, Rumford, Shaftsb. Silverton, Sodbury, Wallingford Wells, Witheridge. 25. Banger, Barnet, Canvey-island, Forrell-row, Malham. 27. Builth, Catstreet, Machynleth, Newport, (Pembroketh.), Pershore, Sarnfoldryn, Wigan. 28. Bolton (Yorksh.), Bradford (Yorksh.), Folkstone, Hadstock, Harrold, Higham-Ferrers, Huntington, Llanvylling, Standish, Yeovil. 29. Axminst. Bale, Bath. Beccles, Bennington, Brackley, Bradford (Yorksh.), Buckfastleigh, Buntingford, Cambren, Cardiff, Great Clackton, Fareham, Grassington, Hartley Row, Hirton, Hodsdon, Hook Norton, Hunspill, Landrake, Langport, Lingfield, Llangerniew, Loftwithiell, Mansfield, Newnham (Kent), Okehampton, Oluey, Red-Lynch, Reephham, Rhydyllatdry, Spalding, Stafford, Standish, Stebbing, Tolcsbury, Tring, Wadhurst, Watton, Wem, Winterburn, Witney. 30. Bradford (Yorksh.), Bridgnorth, Buxtead, Harleigh, Thwaite.

July 1. Criccieth, Drusllwyn, Haslingden, Hereford, Newenden, Penshurst, Thorney, (isle E.) 2. Ivelchester, Richmond, Testinivg, Toller-down, Walton (Ess.), Wickwater, Yttradmirik. 4. Broughton H, Chesterf. Dolegelly, Falkingham, Green Poole M. Leek, Salop, Sidley, Sputty, Stagshawbank, Wakefield, White-smith. 5. Ashborne, Bedale, Bedford, Beverley, Bishops-castle, Brecon, Bryset, Burford, Chester, Chesterford, Church-Whitefield, Clayton, Congleton, Couthorpe, Croydon, Devizes, Dorchest. Easingwoud, Eyminge, Gloucest. Harlestone, Harriot-tham, Haxey, Hertf. Kennington, Lancast. Launceston, Leicest. Lincoln,

coln, Littlebourn, Llanerillo, Messing-potton, Narberth, Newbury, South Petherton, Pevensey, Plint, Pontypool, Probus, Ruiton, Torrington, Tunbridge, Ulpho, Underwood, Wainfleet, Wakefield, Wareham, Warwick, Wenlock, Winterton, Woodland. 6. Bedale, Kettlewell, Newcastle (Staff.), Royston. 7. Bovey Tracy, Brentwood, Brumhill, Chapelin le Firth, Kenninghall, Laycock, Northop, Painpill, Penryn, Taunton, Uppingham, Whitechurch (Hants.) 8. Southwater. 9. Langadock, Machynleth, Uffculme. 11. Abbotsbury, Ashington, Bala, Blundford, Buckingham. Burnley, Caermarthen, Dulverton, Foulney's Island, Fordingham, Godalming, Grantham, Hollington, Holsworthy, Hythe, Iver, Knotsford, Lampeter, Leeds, Leominster, Macclesfield, Market Bosworth, Marlborough, Mountsorrel, Pembroke, Peterborough, Petersfield, St Peter's, Portsmouth, Ringwood, Scotter, Seven Oaks, Southam, Stockbridge, Stockenchurch, Stowmarket, Sudbury, Talgarth, Thaverton, Upton, Wolverhampton, York. 12. Caerwith, Howden. 13. Congleton, East Grinstead, Neath, Swanzey, Woburn. 14. Spilsby, Winterringham. 15. St Asaph, Dronfield, Great Bedwin, Little Hadham, Bury-green, Pittlewell, Seamore, Stevenage, Twysford Up-Holland. 16. Burton, Helmley-Blackmoor, Milksham, Newmarket (Flint.) 18. Albrighton, Albury-Putmore Heath, Atheritone, Banwell, Bentley, Biddeford, Camelford, Chipping-Norton, Cirencester, Denbigh, Emfworth, Penny-Stratf. Haverfordwest, Horsham, Kirton, Llanidlos, Llanybiddar, Moreton, Hamstead, Morpeth, Newcastle (Caermarthenth.), Overton, Patrington, Penrice, Sherborne, Stockton, Tenbury, Topcliff, Wantage, Warrington. 19. Bolton (Lanc.), Carphilly, Clay. 20. Alfreton, Barkway, Bergholt, Betley, Carleton, Helstone, Honiton, King's-bridge, Leonard-stanley, Rofs, Tenby. 21. Beeding, Bromyard, Clithero, Corwen, Garstang, Swaffham. 22. Allington, Biggleswade, Bellericay, Chesham, Dartford, Ely, Frome, Haworth, Kidwely, Monkton, Newton (Hants.), Ramsey, Tetbury, Whitgift. 23. Colchester. 25. Ainswick, Aylesford, Barnard-castle, Beckhamstead, Bilsden, Bristol, Bromley, Campden, Castle acre, Chelwood, Little-Clackton, Derby, Dunwich, Earith, Epson, Ewhurst, Fotheringhay, Giffing, Harpley, Hock-

hold, Ipswich, Llanrhiader, Leigh, (Kent), Lidd, Lindsey, Liverpool, Luggershall, Malpas, Middlewich, Milton, Milverton, North-Down, Pocklington, Poulton, Reading, Seaford, Shoreham, South Reppo, Staple, Stone (Staffordsh.), Tiptery-place, Torrington, Totness, Tregony, Trew, Trowbridge, Great-Wakering, Waltham (Hants), Wigmore, Wisbeach in the isle of Ely, Yarmouth, (Hants). 26. Abbey-Milton, Clare, Hastings, Horsmanden, Kirby, Llaneliom, Landsfawel, Leighton (Bedfordsh.), Post-down, Sherborne, Tamworth. 27. Falmouth, Market-Deeping, Newport (Salop.) 28. Leek, Menchinot, Winchcomb. 29. Chailey, Mattingley, Wevesfield. 30. Chilmark, Hornby, Llamamon in Yale.

August 1. Angmering, Barton (Hants), Betheriden, Brightlingsea, Brookland, Broughton (Lancash.), Burnham (Norf.), Chepstow, Corse-heath, Cowbridge, Cowling, Exeter, Frampton, Henfield, Hoo, Lampetar, Landover, Lanttrisset, Lidford-green, Loughborough, St Margaret, St Margaret's near Marlborough, Newent, North-curry, Odiham, Otley, Partney, Reddich, Slaidburn, St Germain's, St Neot's, St Stephen's, Stogumber, Summerton, Thandilton or Francion, Uttoxeter, Uxbridge, Wisbeach (Isle of Ely), Whitehaven. 2. Battlefield, Bridgenorth, Calne, Chumley, Headon, Ickleton, Ilchester, Keswick, Kingston, Kington, Langeridge, Long-Cromarsh, Magdalen-hill near Winton, Mold, Newark, Norwich, Stockbury, Stony-Stratf. Thetf. Wedmore, Wisbeach, Yarm. 3. Daventry, Hitcham, Kingston. 4. Carnarvon, Earl Soham, Elther, Higham-Ferrers, Llandegla, Kingston, Thirsk. 5. Altringham, Ashton under Line, Audley-end, Bicester, Boscastle, Castletown, Chard, Cheltenham, Chertsey, Chichester, Doncast. Dorchest. (Dorset.), Dudley, Eccleshall, Garner-street, Hatfield, Broad-Oak, Hexham, Kirkoswald, Llandfechell, Langindairn, Northamp. Oakeham, Queenborough, Ravenslaß, Rhos-Fair, Saltash, Skipton, Stamford, Staverdell, Trapston, Thirsk, Wattlebury, Westbury (Salop), Wetherby. 6. Baldock, Ealing, Illey, Goldsmithay, Holtwood, Linfield, Rhyadar, St Anne's hill (Devizes.) 8. Crowcomb, Curry-rival, Horsham, Howey, Ruthin, Shepton Mallet, Shifnal, Stamford. 9. Llanrwst. 10. Alluc-church, Appleby, Ashburton, Deddington, Duffryn, Flint, Hawkhurst, Hurst-perpoint, Landisdown, St Lawrence (Corn.), St Lawrence (Kent), Leachlede, Membury, Newbargh, Pridy, Snaith,

Snaith, Thaxstead, Waltham, St Lawrence, Warminster.
 11. Boston, Duninworth, and Snape. 12. Banbury,
 Bettws, Bridford, Caergwryley, Caermarthen, Chrissing-
 ham-Magna, Dunholme, Dunstable, Feverish. Green,
 Hay, Highworth, Hornsea, Linfield, Malling, Newcas-
 tle upon Tyne, Newton (Lanc.), Plympton, Sheepwash,
 Shrewsb. Sleaford, Stowmarket, Talybont, Treganatha,
 Uffculme, York. 13. Bakewell. 15. Attleburgh, Car-
 philly, Keynsham, Lelant, Liskeard, Llanusydd, Mar-
 ket Welton, Newport (Mon.), Oswestry, Ottery, St
 Harmon, St Mary-hill, Stamfordham, Thornbury, Tre-
 castle, Tutbury, Worcest. Yarlinton. 16. Althorne,
 Brig, Burgh, Louth, Pentraeth-Mon, Telsam. 17. Dal-
 wood, Donnington, Knareborough, Llanderfel, Llan-
 sannan, Penystreet in Trawsfynydd. 18. Aberwingregin,
 Beddgelert, Chapelin le Firth, Clynogfawr, Emiworth,
 Navemby, Rippon, Settle. 19. Clack, Pwlhely, Reath,
 Settle. 20. Abergely, Blackmore, Chorley, Moorlinch,
 Penmorfa, Settle, Weldon. 22. Arundel, Bedford, Cayo,
 Cheadle, Crediton, Farnham, Frodsham, Handford,
 Harlech, Hartlepoole, Horncastle, Kilgarren, Kilham,
 Llangolen, Ludlow, Martock, Melton-Mowbray, Mur-
 ras, Newburgh, Oundle, Romney, Rugby, Settle, Stroud,
 Teitniwg, Winflow, Wondford-Eagle. 23. Belford,
 Boteley, Penmachno. 24. Abbot's Bromley, Ashby de la
 Zouch, Barnet, South Benfleet, Brachnell, Buckfast-
 leigh, Chipping, Cranborne, St Decumans, Eglwysfach,
 Kipmash, Lambert-castle, Lee, Loffwithiell, Meer, New-
 bury, Sallcot, Southwold, Wainfleet. 25. Barnet Bing-
 ley, Coxwold, Elefinere, Haughley, Hermitage, Land-
 rake, Lansaiver, Nefyn, Partney, Ripley (Yorksh.),
 Watchet. 26. Bampton (Oxfordsh.), Barnet, Bingley,
 Blagon, Borth, Carlisle, Corby, East-brent, Elsdon, Gil-
 borough, Goudhurst, Haver-hill, Hermitage, Hinkley,
 Ilmister, Little-Driffeld, Northampton, Porthaethwry,
 Preston (Lanc.), Rhos-Fair, Ripley (Yorksh.), Romsey,
 Swansey, Stroud, Tollerton. 27. Bingley, Cerigy, Dru-
 idion, Giffborough, Ilmister, Rhayada, Kipley (Yorksh.)
 29. Cawton, Gressford, Kilmington, Llanerilla, Mor-
 bath, Overton, Pampill, Phillip's-Norton, Sampford,
 Peverell, Tarperley. 30. Linton, Newn, Spalding. 31.
 Brampton, Lambert-castle, South-Moulton, Wicks.

September 1. Alston, Dronfield, Gillingham, Marn-
 ham, Pontefract, Spittle, Tregony. 2. Hingham Holy-
 well,

well, Kettlewell, Penkridge, Steeple-Ashton, Snaith, Stevenage. 3. Llanidlos, Lung Preston, Trefilhiw, Wirksworth. 5. Abercromway, Beaulieu, Brighthelmst. Epsstock, Buckingham Burnham (Essex), Burwash, Chipping-Norton, Chorley, Colsham, Crewkerne, Egdean, Egton, Birmingham, Frampton, Hatherleigh, Haverford-west, Horringer, Kidderminster. King's Norton, Kington, Lampeter, Leominster, Maresfield, Monmouth, Montgomery, Namptwich, Newcastle, Old Chapel, Plyden, Redruth, Road, Sidmouth, Silverton, Stallbridge, Stockwith, Tewksb. Toddington, Wanbrough near Guildford, Warwick, Westham, Whittingham, Wivenhoe. 6. Baddlesmore, Camelford, Donnington, Market-Raisin, Ware. 7. Holy-cross, Kilmington, Newton-Abbot, Preston (Lancash.), Stowey, Tidswell, Wymondham. 8. Bishop's Lydeard, Cardiff, Cardigan, Denbury, Frittenden, Glastonbury, Ormskirk, Rudland, Stourbridge, Talsarn, Wymondham. 9. Ashford, Bishop's-castle, Broadworthy, Caerwyth, Carmarth. Epworth, Fordingbridge, Harlestone, Harlow, Helstone, Leachlade Newent, Tavistock, Weston, Zoyland. 10. Brecon, Dinafmondy, Fowey, Newport (Salop), St Mary Gray. 12. Adversean, Brentf. Dundry, Focsett, Giles-Hill near Winton, Horsebridge-common, Horsted-Kaynes, Neath, Oakham, Poole (Montgomsh.), Stegursfey, Tamworth, Tollerdown, Wareham, Wilton, Wimple. 13. Brentf. Dilston, Marsh, Holbeach, Iron-Acton. 14. Ashill, Bassildon, Brentf. Congerbury, Frome, Goodnestone, Lincoln, Pickering, Richm. Ryegate, St Udey, Sumer-Court, Wherwell, Winbourn, Witham. 15. Brentf. Durham, Grimstey, Mark, Sandbach, Upton. 16. Bettws, Freshford, Luttrethworth, Tillingham, Woolpit. 17. Bellingham, Llamwst, Lee, Matham, Northiam, Penrice, Probus Wantage, Weldon, Wilmington. 19. Abingd. Amertham, Atherstone, Barnstaple, Beaumister, Beaumaris, Breewood, Buckland, St Mary, Callington, Carlisle, Chatham, Clack, Crawly, Cuckfield, Eastmeon, Egremont, Gisborough, Guisburn, Harbottle near Rothbury, Kirby-Moor-side, Glandysell, Little Driffield, Machynleth, Maldon, Market Drayton, Matham, Northamp. North-Bradley, Painswick, Partney, Shouldham, Silmiston, Staines, Steyning, Sturkich-Fair, Swindon, Usk, Uttoxeter, Waltham, (Leicestersh.), Waterleigh, Weck St Mary, Westerham, Woodbury.

Hill near Bere, Worcester, Wooten-Courtney, Wrexham. 20. Dolegelly, Gifsbrough. 21. Backwell, Basingstoke Downs, Bridgew. Burnham (Bucks), Caerleon, Chudleigh, Clapham, Crediton, Criklade, Evetham, Hawkhead, Ireby, Knighton, Liskeard, Lyme, Maiden Bradley, Manchest. Padstow, Penmachao, Pennystreet in Trawsfynydd, Plymouth, Reading, Shawdbrook, Silfoe, Tendering, Thorney in the Isle of Ely, Woodbr. 22. Llannarth, Llemuwheleyn, Yarbrough-Castle. 23. Beddgelert, Clynoglawr, Derby, Saxmund. Talgarth, Tuxford. 24. Bootle, Haverford West, Langport, Pwlhely, Stretton-church. 26. Abergavenny, Arundel-Aylebury, Boston (Lincolnsh.), Bungay, Burford, Chesterfield, Clayton, Denbigh, Easingwoud, Grassington, Groombridge, Hartland, Hazelmere, Headon, Ipswich, Narberth, Newburgh, Padiham, Pembroke, Penmorfa, Porthaethwry, Ramsbury, Rhayader, Rockingham, Rotherstridge, Shroton, Spalding, St Stephens, Stratf. (Warwicksh.), Tattershall, Tettiniwg, Tenbury, Thetf. Titchfield, Waltham-Abbey, Weighton, Wivelscombe, Wotton-Underedge, Wycomb. 27. Aylsham, Derby, Dorstone, St Ninion near Fenton, Powder-Batch, Rogate, Spotty. 28. Chesham, Dereham, Gloucest. Llanrhiader, Ludlow, New-bridge, North-leach, Stauford. 29. St Alban's, Alton, Ash, Blackobys, Canterb. Chagford, Cranbrook, Framlingh. Frewan, Henley (Oxf.). Hope, Horsebridge, Llangerniew, Llanymyneck, Lowestoff, Maidenhead, Marketjew, Meer, Smith, Southminst. Stoken-church, Teingmouth, Tring, Wallingf. Watton, Woodham-Ferris. 30. Blackburn, Brough-hill, Feckenham, Llanelly, New-Church, Oagar, Ruthin.

October 1. Brachnell, Brading, Bromsgrove, Culmstock, Dinasmondy, Hawarden, Catharine-hill, Otley, Redruth. 2. Aberguilly, Appletreewick, Baldock, Beccles, Bolton (Lanc.), Braintree, Buckingh. Badworth, Bailth, Burgh, Cerne, Coleshill (Stafford.), Coleshill (Warwick.) Croydon, Daventry, Devizes, Downton, Dudley, Easbry, Fordingham, Hambledon, Hemfley-Blackmoor, Hingham, Holsworthy, Lamborn, Howden, Ledbury, Lewes, Malling, Nayland, Northallerton, North Tawton, Nottingham. Peterbor. Retford, Rothbury, Rudham, Sherstone, Shrewsb. Stafford, Swineshead, Tarring, Warham, Wendover, Woodstock. 3. Corby, Hounslow, Nottingham. Pentraeth Mon, Sherborne, Work.

fop. 4. Alnwick, Harrold, Macclesfield, Malham, Nottingham. Ubley, Walshall. 5. Axminster, Druslwyn, Inglewhile, Lansadwin, Llanellium, Llanvylling, Leighton (Huntingdonsh.), Rochf. Roylton, Steple. 6. Bishop Aukland, Blyth, Brackley, Cayo, Chapelin le Firth, Chertsey, Dewsbury, East Hagburn, Gaywood, Market-Raisin, Porlock, Sherburn, Wooburn. 7. Billericay, Bury, Stockton. 8. Challock, South-Moulton. 10. Aberconway, Abergeny, Barnsley, Basingstocke, Bedale, Birmingh. Blockley, Brient, Bridport, Buckland, Carmarth. Charlbury, Chester, Cliffe. Cockermouth, Corwen, Deal, Dolegelly, East-bourne, Falm, Fazley, Fenny Stratf. Gosport, Great Thurlow, Hadleigh, Hartlepool, Haslinden, Hay, Higham Ferrers, Hodnet, Hull, St Ives, Huntingdonsh.), Kegworth, Kettering, Kingsland, Lancaster, Lanvichangel, Lavenham, Leicester. Lenyher, Looe, Malton, Marden, Market-Deeping, Mathry, Mildenhall, Milverton, Mitchel-Dean, Moreton, Newhaven (Suffex), Norton, Ower-Mayne, Penkridge, Pentree, Pontypool, Ross, Rushlag, Green, Sitting-bourn, Selby, Sheepwash, Shefford, Shouldham, Sleasford, Smardon, Solyhull, South-Brent, Steyning Stony Stratf. Stortford, Stowe (Lincolnsh.), Swinden, Tavist. Tewksb. Thame, Tiverton, Torrington, Uxbridge, Wadebridge, Watlington, Wells, Weyhill, Withyam, Yarm. 11. Bedale, Bedt. Blackheath, Burnley, Colu, Kingclear, Monkton, Salisbury, Sellinge, Shipston, Wragby. 12. Caxton, Dichling, Hitchin, Llandovery, Northop, Otterton, Seven-Oaks, Succlebridge. 13. Banbury, Chapel Cunnan, Epping-Lymington, Mansf. Rackham, Rhos-Fair, Wigan, Windsor. 14. Haworth, Leybourn, Sarr Trecafile, Waltham H. Wells. 15. Ashover, Carlisle. 17. Alcester, Alpbington, St Asaph, Bakewell, Ballbroughton, Christ-church, Cowling, Donnington, Havant, Ivinghoe, Knaresborough, Llanthlad-Dyffin-Alwyd, Llenuwchlllyn, Maidst. Navenby, Swinstead, Thorne, Turner's hill, Wellow, Wenlock, Wooler. 18. Barnet, Belbroughton, Little-brickhill, Charlerton, Chipnam, Chilleborough, Cowbridge, Ciccieth, Doilstone, Eversley, Farringdon, Halesworth, Harwich, Hatfield, Haverford-west, Henley (Warwicksh.), Hindon, Kirkham (Lancash.), Lantriffent, St Lawrence, Laxfield, Luton, Midhurst, Newham (Gloucestershire), Newton-Peppelford, Overton, Partney, Tidswell, Up-haven,

haven, Ufk, Winterburn, Workington. 19. Abberford, Barnet, Corfe-castle, Lammon in Yale, Lampeter, Market-Harborough, Patney, Sawbridgeworth, Testinivg, Trevena, Whitechurch (Hants). 19th, and the two following Saturdays at Swansey. 20. Ashborne, Cerigy-Druidon, Chicheft. Colcheft. Devizes, Elham, Ely, Gainsborough, Heref. Kingfbrumpton, Rothersfield, Slaidburn, Tenby. 21. Blackburn, Bridlington, Concerdd, Rudgley. 22. Barking, Booth, Carliffe, Clithero, Newmarket F. Newport Pagnell, Overton. 24. Aberfraw, Brampton, (Devonfh.) Borth, Burrowbridge, Caifler, Cleeaynog, Dalton, Hurling, Hailings, Llangenock, Lanfawel, Lighton, (Bedfordfh.), Lenham, Market-Drayton, Marfhfield. Matlock Newn, Porthaethwry, Ripley (Derbyfh.), Sputty, Stow (Gloucefterfh.), Sturminft. Tamworth, Upottery, Wainfleet, Winton. 25. Aberwingregin, Cartmel, Mortimer, Potton, Perfhore, Queen-Camel, Stockport, Whittlefea in the ifle of Ely. 26. Abberford, Grantham, Llandegla, Llanfannan, Ovingham. 27. Aberguilly, Bromyard, Caergwrley, Cleobury-Mortimer, Darley-Flafh, Daventry, Marfh in the ifle of Ely, Nantglyn, Ulverftone. 28. Alhby de la Zouch, Askrig, Bangor, Biddenden, Biggleswade, Chepftow, Cullumpton, Dif, Droitwich, Ealt Dean, Edwinstone, Forest-Row, Llanidlos, Lifton, Linfield, Milbourne-Port, Needham, Newbury, Newmarket (Suff.), Pocklington, Plympton, South Harting, Thirfk, Totnefs, Warminft. Watton, Whitechurch, (Salop.) 29. Abbey-Holm, Amblefide, Askrig, Banbury, Bourn, Bridgnorth, Broadwater, Burton, Chagford, Charing, Chedder, Ewell, Halited, Hampton, Henley (Oxf.), Holt (Denbighfh.) Howey, Hunmanby, Kidweiy, King's Cliff, Kirkby Stephen, Marlow, Mongham, Newcastle (Northumb.), Pleafley, Radnor, Sedberg, Stainton, Thirfk, Towceft. Tunbridge, Wellingborough. 31. Crowcomb, Llanillechyd, Newhaven, (Derbyfh.)

November 1. Coventry, Earith, Fordftreet, Llanybidar, Lytcham, Newark, Prefcott, Rothbury, Settle, Wadhurft, Walden, Wingham. 2. Altringham, Bletchingly, Buckland, Chard, Downham, Farnham, Helmsley-Blackmoor, Hoxne, Loftwithiell, Loughborough, Toddington, Wilton, Wokingham, Wye. 3. Bromfield, Campden, Poole (Dorf.), Swaffham, Talgarth. 4. Ecclethall, Litchfield. 5. Applefhaw, Llanthechell. 7.

Barwic

Barwick-Hill, Helmsley-Blackmoor, Horley, Lampeter, Manchell. Middleham moor, Newton-Abbot, Newcastle (Stafford.) Newport, (Monmouthsh.), Rochdale, Sutton (Hants), Talfarn, Trefriw, Tregony, Witchbury. 8. Aberconway, Alford, Barton-Underwood, Bingham, Blandf. Buckingh. Chilham, Chipping-Norton, Cirencester. Dulverton, Downmow, Hatherleigh, Helstone, Hertf. Hexham, Kendall, Kighly, Knotsford, Llamedy, Llanrhiader, Leeds, Leominst. Lidney, Massingham, Pensford, Romsey, Stamf. Stratton, Sutton (Warwickshire), Warwick, Whiston, Woodstock. 9. Albrighton. 10. St Austle, Caeirwith, Chapelin le Firth, Falkingham, Porlock, Ruthin. 11. Ashburton, Brandon, Cambon, Langport, Lenton near Nottingham. Liverpool, Macclesf. Newburgh, Nunny, Penrith, Pwllhely, Reeth. 12. Amlwich, Bisley, Blakeney, Brumpton, Callington, Camrass, Chelmsf. Chirk, Dunstable, Fairford, Halchaston, Kilgareen, Kilham, Lanwinio, Lincoln, Little-Mountain, North Moulton, Penmorsfa, Pen-traeth Mon, Rowland's Castle, Stelling, Stoney-Stratf. Three-Lords, Wakefield, Wooburn. 14. Allentown, Amersbury, Biddeford, Bishop's-Castle, Carmarth. Dinasmonddy, Elefmere, Gifsborough, Huntingd. Kinglt. Llanerillo, Leek, Loddon, Mayfield, Montgomery, Porthaethwry, Teltinivg, Trecastle, Wakef. Wotton-Basset. 15. Egton, Otley. 16. Andover, Beverly, Poole (Montgomeryshire.) 17. Brecon, Bridge end, St Columb, Headon, Hunmanby, Ingleton, Launcest. St Leonard's near Bedford, St Leonard's (Suffex), Malling, Neup. Osterford, Warsop, Willington, Wells, Yeovil. 18. Cuckfield, Dorstone. 19. Cross-in-hand, Tiruro. 21. Aberwingregin, Conwydd, Dolton, Feltwell, Llanufydd, Llanybiddar, Petworth, Ruabon, Skipton. 22. Battle, Bawtry, Boscastle, Bow (Devon), Brigstock, Clunn, Crowle, Darlington, Deddington, Dolegally, Dover, Fairbach, Falkingham, Fillingham, Guilf. Haltwistle, Hempton, Llangollen, Lawhaden, Marl. Martin's-Town, Mold, Monm. New-Buckingham, Newcastle. (Carmarthensh.), Pembridge, Rippon, Rugby, Scarborough, Shaftesb. Shifnail, Skipton, Stamford-Bridge, Standish, Storrington, Warkworth, Wem, Wetherby, York, and every other Thursday in the year at York. 23. Witney. 24. Coleford, Eglwyslach, Holt (Nortolk), Langtown, Penzeance. 25. Chetterfield,

field, Chipping Norton, Elstow, Frome, Gravesend, Machynleth, Thwaite. 26. Castle Town, St Ive's, Landover, Llanfechell, Little Dean. 28. Bakewell, Eglwysrw, Feuny Stratf. Gloucest. Gorfynon, Harlow, Hartlepool, Hook Norton, Hortham, Northamp. Sheffield, Spaldick. 29. Ashborne, Endfield, Llangerniew. 30. Alfrilston, Belchamp, St Paul's Broadhembury, Bromhall, Buntingford, Cardiff, Chipnam, Colyton, Cubley, Flint, Fring, Hempnall, Llantanan, Maidenhead, Moreton Hamstead, Northwoud, Presteign, Warrington, Wells, Week, St Mary.

December 1. Hythe, Ingatestone, Penrice, Rotherham, Tutbury. 2. Spuaty. 3. Ashton under line, Bettws, Garfarg, Louth, Talgarth. 5. Atheritone, Carnary, Dursley, Grefsford, Lamborn, Newark, Penybout, Pluckley, Sandw. Staff. Tenby, Wenlock. 6. Bodmin, Builth, Cornhill, Cranborne, Exeter, Grefsfinghall, Launcest. St Nicholas, Northwich, Sidland, Stoke (Norf.), Tockington, Toddington. 7. Cearigy Druidion, Clithero. 8. Llancliom, Leicest. Ludlow, Malpas. 9. Barnstaple, Bradfield, Leybourn. 10. Bewdley, Bolney, Lanon, Liskeard, Newmarket Fl. Newport (Salop), South-Moulton. 12. Aberfraw, Abingd. Ampthill, Baldock, Bettws, Bewdley, Bolney, Bolton, Brackley, Chagford, Chawley, Coham, Kolingburn Duces, East Grims. Gargrave, Gringley, Harlech, Kimbolton, Kirton, Langadock, Lanport, Llanrwst, Narbeth, Oswestry, Petersf. Ringwood, Rochest. Rolis, Shrewsbury, Stratton, Tavistock. 13. Bedale, Knaresb. 14. Thirsk, Threacastle. 15. Kettering, Namptwich. 16. Comb St Nicholas, Dolegelly, Newn. 17. Arundel, Grantham, Hellstone, Higham-Ferrers, Hornsea, St Neot's, North-Tawton, Spalding, Wallingford, Woodst. 19. Beaumaris, Bedf. Cardigan, Ledbury, Northamp. Painscastle, Thornbury, Truro, Wotton-Basset. 20. Bradf. (Yorksh.) 21. Boxford, Bradford (Yorksh.), Droitwich, Grinton, Hawarden, Highbickinton, Kirkby-Lonsdale, Laycock, Penryn. 22. Bradford (Yorksh.), Carphilly, Newport Pagnell. 24. Alnwick, Hawarden, Llanwnen. 26. St Alaph, Beckley, Korwen. 28. Cock Hill. 29. Bridgewater, Stonehouse. 30. Milbourn.

LIST of the principal FAIRS in SCOTLAND.

JANUARY. Kilsyth, 2 day. Muthil, 19 Killin in Breadalbane, St Fillans, 20 Kilmanning and Dunkeld, 22. Falkirk, 31. Tain, 1 Tuesd. Strathaven and Cupar in Fife, 1 Thursd. Crief, Old-Meidrum, Peebles, and Glasgow, 2 Tuesd. Ecclefechan, Frid. after 11. Lockerby, 2 Thursd. O. S. Dunfermline and Dornock, 3 Wedn. O. S. Stirling and Lochmaben, last Tuesd. O. S. Mechlin, last Wedn. and Thursday O. S.

FEBRUARY. Blair in Athole, 1 day. Kilmarnock and Dunkeld, 3. Nairn, 8. Down, 11. Dumfries, 24. Linlithgow, 25. Largs, 1 Tuesd. Dummochie, 1 Frid. Ruthven of Badenoch, and Kirton of Weem, 2 Tuesd. Monymusk, 2 Wedn. Hamilton, 2 Thursd. Ecclefechan, Friday after 11 day. Glenhee, 3 Tuesd. Inverness, 3 Wedn. Paisley, 3 Thursd. Kirktown of Alford, and Lanerk, last Tuesd. Forfar, last Wedn. Cupar in Fife, 1 Wedn. O. S. Lockerby, 2 Thursd. Falkland, last Thursd. O. S.

MARCH. Dunkeld, 8 day. Perth, 16. Peebles, Kilsyth, and Nairn, 1 Tuesd. Inverkeithing, 1 Wedn. Strathaven, 1 Thursd. Calder, 2 Tuesd. Dunfermline, 2 Wedn. Tain and Dumbarton, 3 Tuesd. Ecclefechan Frid. after 11. Kenmore in Breadalbane, 1 Tuesd. O. S. Dornock 1 Wedn. O. S. Rutherglen, 1 Frid. O. S. Lockerby, 2 Thursd. O. S. Kinross, 3 Wedn. O. S.

APRIL. Auchtermuchty, 5 day. Selkirk, 15. Langholm, 16. Anstruther, Tuesd. after the 11. Kippen and Bathgate, 2 Wedn. Ecclefechan, Frid. after the 11. Glasgow, Skier, Tuesd. Ochtergaven, last Tuesd. Inverness, 3 Wedn. Dunfermline, 4 Wedn. Lanerk, last Wedn. Dumbarton, Cupar in Angus, Old Aberdeen, Elgin, and Melrose, Thursd. before Easter. Cupar in Fife, 1 Wedn. O. S. Lockerty, 2 Thursd. O. S. Strichen and Lochmaben, last Tuesd. O. S. Falkland, last Thursd. O. S. Rutherglen, last Frid. O. S.

MAY. Killin in Breadalbane, 5 day. Muthil and Dysart, 6. Carluke, 10. Lithgow and Falkirk, 12. Gartmore, 16. Greenlaw, 22. Kippen, 26. Skirling, Tuesday before the 12. Kilmacquhar, 14. Ecclefechan, Frid. after 11. Glammis, 1 Wedn. and Herriot-house, 1 Frid. after 26. Lithgow, 1 Thursd. after old Whits. Aberdeen, 1 Tuesd. Stranrawer, 1 Frid. Kirktown of Weem, 2 Tuesd. Down and Peebles, 2 Wedn. Dumbarton and Renfrew, 3 Tuesd. Paisley and Inverkeithing, 3 Thursd. Elgin and Dunning, 4 Tuesd. Ochtergaven, last Wedn. Stirling, last Thursd. Kilsyth, last Frid. Kilmarnock, 1 Tuesd. O. S. Rutherglen, 1 Tuesd. after Trinity Sunday. Castairs, 1 Thursd. O. S. Machlin, 2 Tuesd. O. S. Lockerby, 2 Thursd. O. S. New-mills, 3 Tuesd. O. S. Kinglassie, 3 Wedn. O. S. Bathgate, 1 Wedn. after 15. O. S. Cottown, 3 Thursd. O. S. Langholm, last Tuesd. O. S. Lanerk and Cupar in Fife, last Wedn. O. S. Forganenny, last Thursd. O. S.

JUNE. Dull, 9 day. Perth, 15. Dunning, 20. Ceres in Fife, 24. Bucklivie, Forfar, Falkland, and Burntisland, 26. Kirkytholm, 27. Kenmore in Breadalbane, 28. Falkirk and Earlston, 29. Whitsonbank near Wooler, Whittund. Tuesday. Jiddburgh, 1 Tuesd. after Whitsonbank. Ecclefechan, 1 Tuesd. after 11. Linton-markets

markets and Melrose, 1 Wednesday. Evemouth, 1 Thursd. Aberdeen, Renfrew, Dunse, and Largs, 2 Tuesday Brechin, 2 Wed. Colinsburgh, 2 Frid. N. Berwick, Dysart, Gifford, and Ruthven of Badenoch, 3 Tuesd. Dun's market, 3 Wedn. Swinton, and Inverkeithing, 3 Thursday. Lauder, 3 Frid. Bathgate, 4 Wedn. Kinghorn, last Frid. Kinross, 1 day O. S. Moffat, 11 O. S. Cupar in Fife, 25. O. S. Nairn and Glenshee, 1 Tuesd. O. S. Dornock, 2 Wed. O. S. Lockerby, 3 Thursday O. S. Falkland last Thursday O. S.

JULY. Meikleour, 2 day. Strathfillan in Breadalbane, and Portrie, 3. Carnwath, Yetholm, Perth, Anstruther East, and Eddlelton, 5. Kelfo, Langholm, and Falkirk 10. Auchtermuchty, 13. St Boswall's, 18. Kenmore in Breadalbane, Langholm, and Down, 26. Moffat, 29. or Tuesday after. Paldy in Mearns, Tuesd. after 11. Peebles, Tuesd. before 12. Ecclefechan, Friday after 11. Forfar, Oldhamstocks, and Ormiston, 1 Tuesday. Leven and Dunfermline, 1 Wedn. Greenock, 1 Thursd. Galashiels, 1 Frid. Glasgow, 2 Monday. Haddington, Mellerstain, Culsalmond, 2 Tuesd. Tain, and Torryburn, 2 Wedn. Hamilton, 2 Thursd. Largs, and Renfrew, 3 Tuesd. Kirkcaldy, Inverness, and Bathgate, 3 Wedn. Elgin, last Tuesday. Lauder, 4 Frid. Stirling, 20. O. S. Machin, 22. O. S. Dornock, 22. O. S. Cupar in Fife, 25. O. S. Strichen, 1 Tuesday, O. S. New-mills, 2 Wedn. O. S. Carstairs, 2 Thursd. O. S. Kilmarnock and Kinross, 3. Wedn. O. S. Rutherglen, 3 Frid. O. S. Falkirk and Lochmaben, last Tuesd. O. S. Lanerk, last Wednesday O. S.

AUGUST. Linlithgow, 2 day. Muthil, and Kelfo, 5. Melrose, 12. Dundee and Inverness, 15. Kilsyth, 16. Meikleour, 19. Auchtermuchty and St Laurence, 21. Dunse and Ecclefechan, 26. Kirkwall in Orkney, and Lockerby, 1 Tuesday after 11. Dunfermline and Forfar, 1 Tuesd. Penstoun and Pathhead, 1 Wedn. Oldrain, Musselburgh, Jedburgh, and Dumbarton, 2 Tuesd. Inverkeithing, and Ochtergaven, 2 Wedn. Paisley, and Strathaven, 2 Thursday. Irvine, 3 Monday. Laurence-kirk, in Mearns, 3 Tuesd. Peebles, Tuesd. before 24. Carnwath, Monymusk, Tain, and Bathgate, 3 Wednesd. Dysart, and Inverness, 4 Wednesd. Hamilton, 4 Thursd. Lauder, 4 Frid. Nairn, and Auchinleck, last Wednesday. Stranraer, last Frid. New mills, 22. O. S. Strichen and Jedburgh, 2 Tuesd. O. S. Machlin and Falkirk, last Tuesd. O. S. Carstairs, last Thursd. O. S. Falkland, Thursday after Lammas, O. S. Lanerk, last Frid. O. S.

SEPTEMBER. Linlithgow, 4 day. Kircudbriht, 6. Perth, 9. Eddlelton, Balloch, and Skirling, 15. Kenmore in Breadalbane, 17. Dundee, 19. Falkirk, 21. Jedburgh, 25. Ecclefechan, 28. or Frid. before. Haddington, Air, St Andrews and Renfrew, 29. Nairn, 29. or Friday after; and Little Michael that day fortnight, Langholm, 1 Tuesd. Wemyss, 2 Wed. Dunfermline, 4 Frid. Dumfries, Forfar, Inverness, and Kirkcaldy, 4 Wed. Stirling, 8. O. S. Coldstone in Cromar, 1 Thur. O. S.

OCTOBER. Linlithgow, 2 day. Kirktown of Dull, 6. Blackford, and Parkhead, 7. Crieff and Down, 10. Meikleour and Ochtergaven, 18. Gartmore, 19. Perth, and Ceres, 20. Moffat, 20. or Tuesday after. Kippen, 23. Dunning and Kirkcaldy, 24. Ecclefechan, 26. or Frid. after. Carlisle, Yetholm, St Laurence, and Muthil, 31. Aberdeen and Gifford, 1 Tuesday. Galashiels, 1 Frid. Mid-Calder and Elgin, 2 Tuesday. Monifieth in Angus, 2 Tue ay after

after 11. Leven, 2 Wednesd. Haddington, 2 Thursd. Ratho, Frid.
 after 2 Tuesd. Kinghorn and Colinsburgh, 3 Frid. Tain, Dalkeith,
 and Air, 3 Tuesd. Kilmarnock, Inverkeithing, and Stenton in E.
 Lothian, 3 Wednesd. Swinton and Eaststoun, 3 Thursd. Largs,
 and Ormiston, 4 Tuesd. Bathgate, 4 Wednesd. Kirkintilloch 4
 Thursd. Greenlaw, last Thursd. Lanerk and Lauder, 4 Friday.
 Partoncrails, last Tuesd. Kinross and New-mills, 18 O. S. Stirling,
 22 O. S. Dornock, 22 O. S. or Wednesd. after. Machlin, 27. O. S.
 Mellerstain. and Lockerby, 1 Tuesd. O. S. Cupar in Fife, 1 Thursd.
 O. S. Kinglassie. Thursday before Michael. O. S. Rutherglen, 3 Mon-
 day. O. S. Glenshee, 3 Tuesd. O. S. Lochmaben, last Tuesd. O. S.

NOVEMBER. Kelfo and Down, 2 day. Litheow. 4. Lang-
 holm, 5. Foulis in Perthshire, and Falkirk, 6. Hawick, Kilconquhar,
 and Dysart, 8. Dumblane and Anstruther Easter, 12. Ochtergaven,
 15. Borrowstounness and Lauder, 16. Dunfer, 17. Bucklyvie, 18.
 Langholm, 19. Melrose and Tain, 20. Kilsyth, 23. Down, 26.
 Ecclesfechan, 11. or Friday after. Dunkeld, 22. or Tuesday after.
 Glamis, 1 Wednesd. after 22. Glatgow, Wednesd. after Martinmas.
 Kirktown of Weem, Thursday before 28. Peebles and Oldham-
 flocks, 1 Tuesd. Forfar, 1 Wednesd. Cockenzie and Strathaven, 1
 Thursd. Edinburgh Hallow fair, Jedburgh. and Dumbarton, 2
 Tuesd. Paisley, 2 Thursd. Dumbar, 3 Tuesd. Northberwick, 3 Thursd.
 Ruthven of Badenoch, and Greenock, 4 Tuesd. Dunfermline and
 Inverness, 4 Wednesd. Hamilton, 4 Thursd. Lauder, 4 Frid. Chirn-
 side, last Thursd. Falkland, 1 day O. S. Cupar in Fife, 11. O. S. Dor-
 nock, 22. O. S. or Wednesd. after. New-mills, 29. O. S. Killen in
 Breadalbane, and Moffat, 1 Tuesday O. S. Lanerk. 1 Wednesd O. S.
 Strichen, 2 Tuesd. O. S. Lockerby. 2 Thursd O. S. Bathgate, 1
 Wednesd. after Martinmas O. S. Rutherglen, 3 Frid. O. S.

DECEMBER. Kenmore in Breadalbane. 3 and 24 days. Perth,
 11. St Laurence, 19. Inverness 24. Down, 25. Peebles, Tuesd.
 before 12. Ecclesfechan, Frid. after 11. Tain, Tuesday before
 Christmas. Aberdeen, 1 Tuesd. Renfrew, 1 Frid. Kirktown of
 Alford, Elgin, and Nairn, 2 Tuesd. Tain, 3 Tuesday. Stirling, 1
 Tuesday O. S. Machline. 2 Tuesday and Wednesday O. S. Lanerk,
 last Tuesday. Lockerby, the Thursday before Christmas O. S.

Directions to the Binder.

Place the plates of alphabets and copies between p. 30. and 31.
 the plate of Mathematical figures fronting p. 217. tab. 1. between
 P. 312. and 313. and tab. 2. fronting p. 317.

F I N I S.